Mr. Sinclair presents his
respects to Mr. Embank and
requests his acceptance of a copy
of the Report on "Lessicoid &
alimentary vegetable substance"
published by authority of the
Navy Department.

Bur. of Prov. & Clothing
Oct. 16, 1852

REPORTS

OF TWO

BOARDS OF NAVY OFFICERS,

CONVENED BY ORDER OF THE

HON. WILLIAM A. GRAHAM,

SECRETARY OF THE NAVY.

AT THE U. S. NAVY YARD, NEW YORK, IN NOV. 1851,
AND AT WASHINGTON CITY, IN MAY, 1852,

TO EXAMINE

CERTAIN DESICCATED ALIMENTARY VEGETABLE SUBSTANCES, PREPARED, AFTER THE PROCESS OF M. MASSON, CHIEF GARDNER OF THE CENTRAL SOCIETY OF HORTICULTURE OF FRANCE, BY CHOLLET & Co., No. 6, RUE MARBEUF, PARIS, AND, AFTER THE PROCESS OF DR. J. N. GANNAL, No. 6, RUE DE SEINE, PARIS, BY PEYRUSSET, MOLLER & Co., THE CONSERVE OF MILK, PREPARED BY M. DE LIGNAC, CHATEAU DE MOULEVEDE, PRÈS GUÉRET, (CREUSE,) AND ALSO THE PRESERVED POTATO OF D. AND H. EDWARDS AND CO., No. 1, BISHOPS-GATE STREET, LONDON.

Published by authority of the Navy Department.

WASHINGTON:
C. ALEXANDER, PRINTER,
1852.

NAVY DEPARTMENT,

Bureau of Provisions & Clothing, July, 1852.

The attention of the Bureau was drawn to the subject of the "desiccated vegetables" by the following notice in a newspaper in May, 1851:

"IMPORTANT DISCOVERY.—At the last meeting of the Horticultural Society, London, various dried vegetables, such as peas, haricot beans, Brussels sprouts, carrots, turnips, &c., were exhibited from Peyrusset, Moller & Co., of Paris. These were stated to have been dried by a process peculiar to Dr. Gannal, the celebrated chemist and embalmer of animal substances. This process is understood briefly to consist in dividing the larger vegetables into pieces, and placing them in an apparatus into which dried air is driven, until they have parted with all the water, and have become perfectly dry. In this condition they may be preserved for any length of time, and it is said that their flavor is not at all interfered with, inasmuch as nothing is taken from them except the water they contained, and that, after they are cooked, they are just as good as when fresh gathered. If these facts, therefore, are borne out by experience, the discovery is a very important one, even as regards vegetables, more especially to ship owners, for they can be furnished in this state in quantity, and at a very cheap rate; but in addition to vegetables, fruits, as apples, pears, apricots, &c., and even flowers, may be dried and preserved by the same process, and owing to the rapidity with which the drying is conducted, the latter retain their natural colors almost as brightly as when first obtained from the garden."

Desirous of availing itself of every discovery which might be the means of introducing new elements of comfort and health for the benefit of our seamen, it was the intention of the Bureau to request a friend to make inquiries on the subject, and to procure some of the articles; but unexpected circumstances, of a private nature, having made it necessary for its Chief to visit France in July last, the Secretary of the Navy, in the kindest manner, granted him leave of absence for a few weeks. On arriving in Paris he sought out Dr. Gannal, had frequent interviews with him, found him intelligent, frank and communicative, and received from him much valuable and interesting infor-

mation. In looking over a report of a commission of the Academy of Sciences of the Institute of France, on a communication of the Doctor in relation to his process of drying and preserving plants for an herbal, an allusion was found to a process on a different principle, discovered by M. Masson, for the preservation of vegetables. Wishing to obtain all the information possible on this interesting subject, it was intended to see M. Masson, but that was rendered unnecessary by an introduction with which he was favored by H. S. Sanford, Esq., Secretary of Legation, (our Minister, Mr. Rives, being absent from the City,) to M. Jurien, Director of the administrative services of the French Marine, with whom he had several interviews, and by whom he was furnished with samples of the vegetables prepared by Chollet & Co., after Masson's process, which are used in the French Navy. M. Jurien in the most courteous manner, sent him copies of several reports which had been made on the subject by various naval boards to the Minister of Marine, and other documents.

Advantage was taken on several occasions to make personal examination of the very simple process of preparing the vegetables at the establishment of Chollet & Co.

The connection of Dr. Gannal with Peyrusset, Moller & Co., who had prepared the vegetables after his process, having been discontinued, and his own establishment not having been completed, no opportunity offered for its examination. The Bureau has lately observed with regret, in the papers, a notice of the death of Doctor Gannal, but has been informed that his establishment had been completed, and will probably be continued by his sons. The Doctor had also been engaged for sometime in making experiments in relation to the preservation of fresh meats, and with decided success. On returning to the United States, viâ London, the occasion was embraced to see the Messrs. Edwards, the patentees of the "preserved potato," which has been so favorably recommended by many eminent scientific men, and by officers of the British Navy, in which service it constitutes a part of the ration.

Although the four cases examined by the Boards have not proved satisfactory, this is probably owing to the patentees having been deceived by the persons in their employ in the quality of the potato in the specimens furnished. A most favorable report has however been received from the U. S. Ship Relief (just returned from the coast of

Brazil) on board of which four cases, of 28 lbs. each, had been placed in December last.—See page 73.*

An assortment of the articles was brought to the United States, and the result of their examination will be found in the following reports.

In view of the fact that vegetables, thus prepared, may be taken in large quantities, on account of the little space which they require, and in view also of the beneficial results that would be produced in the preservation of the health of both the officers and the crews of our vessels, together with their comparative cheapness, (the cost being little more than that of fresh vegetables,) it is confidently believed that eventually they will be generally used on board of our naval and merchant vessels.

A table of the quantity of different dried vegetable substances produced from 100 *kilogrammes of the fresh, according to Dr. Gannal.*

Name.	Weight of Vegetable.	Weight when dried.
Potato	100 Kilogrammes.	25 Kilogrammes.
Cabbage	100 "	$7\frac{1}{2}$ "
Carrots	100 "	10 "
Turnips	100 "	8 "
Succory	100 "	8 "
Sorrel	100 "	8 "
Cauliflowers	100 "	10 "
Brussels cabbage . .	100 "	6 "
Spinage	100 "	8 "
Green peas	100 "	10 "
String beans	100 "	10 "
Truffles	100 "	22 "
Beans, flageolets . .	100 Litres.	50 Litres.

* Officers recently returned from the East Indies and the Coast of Africa, speak in like favorable terms of " Edwards' potato," which they had obtained on those stations, and used in their messes.

Comparison of some French weights and measures with the Standards of the United States, expressed to the nearest fraction of the lowest denominations of the latter.

Linear Measures.

U. S. standard, 1 Yard = 3 Feet: 1 Foot = 12 Inches: 1 Inch = 12 Lines.

FRENCH.					UNITED STATES.				
Mètre.	Decimètre.	Centimètre.	Millimètre.		Yard.	Foot.	Inch.	Line.	
1	10	100	1000	=	1	0	3	$4\frac{2}{5}$ +	nearly.
	1	10	100	=	0	0	3	$11\frac{1}{4}$ —	"
		1	10	=	0	0	0	$4\frac{3}{4}$ —	"
			1	=	0	0	0	$\frac{1}{2}$ —	"

Weights.

U. S. standard, 1 Lb. = 16 Ounces: 1 Ounce = 16 Drams: 1 Dram = $27\frac{1}{3}$ Grains nearly.

FRENCH.					UNITED STATES.				
Kilogramme.	Hectogramme.	Décagramme.	Gramme.	Décigramme.	Lb.	Oz.	Dr.	Gr.	
1	10	100	1000	10000 =	2	3	$4\frac{2}{5}$ +		nearly.
	1	10	100	1000 =	0	3	$8\frac{7}{16}$ +		"
		1	10	100 =	0	0	$5\frac{5}{8}$ +		"
			1	10 =	0	0	$\frac{9}{16}$ —		"
				1 =	0	0	0	$1\frac{1}{2}$ +	"

Liquid—Capacity Measures.

U. S. standard, 1 Gallon = 4 Quarts: 1 Quart = 2 Pints: 1 Pint = 4 Gills.

FRENCH.						UNITED STATES.			
Hectolitre.	Dècalitre.	Litre.	Dècilitre.	Centilitre.		Gallon.	Quart.	Pint.	Gill.
1	10	100	1000	10000	=	26	1	1	$0\frac{7}{10}$ —
	1	10	100	1000	=	2	2	1	$0\frac{1}{4}$ +
		1	10	100	=	0	1	0	$0\frac{1}{4}$ —
			1	10	=	0	0	0	$0\frac{1}{2}$ —
				1	=	0	0	0	$0\frac{1}{2\frac{1}{5}}$ —

Note.—The sign + following certain of the U. S. equivalents, means that they are inexact in the sense of being too small; while the sign — signifies their being too large.

The English equivalents in the following table are those obtained by Mr. Hassler, late Superintendent of weights and measures.

LENGTH.

				Inches.
10 Millimètres	=	1 Centimètre	=	0.39381
10 Centimètres	=	1 Decimètre	=	3.93809
10 Decimètres	=	1 *Mètre*	=	39.38092

WEIGHTS.

			Lbs. Avr.		Troy. Grains.
10 Centigrammes	= 1 Décigramme	=	.0002	=	1,543
10 Décigrammes	= 1 Gramme	=	.0022	=	15,433
10 Grammes	= 1 Décagramme	=	.0221	=	154,332
10 Décagrammes	= 1 Hectogramme	=	.2205	=	1543,316
10 Hectogrammes	= 1 *Kilogramme*	=	2.2047	=	15433,159

LIQUID MEASURES.

				Wine. Galls.		Wine. Quarts.
10 Centilitres	=	1 Dècilitre	=	0.026	=	0.106
10 Dècilitres	=	1 *Litre*	=	0.264	=	1.057
10 Litres	=	1 Dècalitre	=	2.642	=	10.567
10 Dècalitres	=	1 Hectolitre	=	26.418	=	105.673

NAVY DEPARTMENT,
October 30th, 1851.

SIR:

The Chief of the Bureau of Provisions and Clothing having reported to the Department that certain alimentary vegetable substances adopted in the French Navy; also a preparation of milk, used in the Navies and Hospitals of that country and England, and a preparation of potatoes used in that of the latter, have been procured with a view to their introduction into the American Navy, if they shall be found to be adapted thereto, I have deemed it proper to constitute a Board of Officers for the purpose of testing the qualities of the articles referred to, and their adaptation as a part of the Navy Rations.

The samples to be tested and examined, with certain observations in relation to experiments to be made, will be sent to you by the Chief of the Bureau of Provisions and Clothing, all of which you will be pleased to have placed in the possession of the Board of Officers, to consist of

Captain BREESE,
Commander CARPENDER,
Commander WILSON,
Surgeon BACHE, and Purser DUNN.

The Report of the Board will be forwarded direct to the Department.

Very respectfully, your obedient servant,
C. M. CONRAD,
Acting Secretary of the Navy.

Captain WM. D. SALTER,
Commandant Navy Yard, New York.

NAVY DEPARTMENT,
October 30, 1851.

GENTLEMEN:

You will be pleased to convene at the Navy Yard, New York, on the 10th of November next, or as soon thereafter as practicable, as a Board of officers of the Navy, for the purpose of examining and testing certain alimentary vegetables, and prepared milk, with a view to their adoption as a part of the navy ration.

The Board will examine and test, with the greatest care, each of the articles procured, as to its quality, state of preservation, retention of properties, and its adaptation as a means of improving the diet of seamen. The Department desires that the Board will make accurate and minute experiments on such articles as may be presented by the Commandant of the New York Navy Yard, who will furnish also certain observations in relation to the experiments to be made.

The result of the experiments and the opinion of the Board will be transmitted direct to the Department.

Very respectfully,
Your obedient servant,
C. M. CONRAD,
Acting Sec. Navy.

Captain S. L. BREESE,
Commander E. W. CARPENDER,
Commander S. B. WILSON,
Surgeon B. F. BACHE,
Purser E. T. DUNN,
U. S. Navy, New York.

REPORT OF A BOARD

COMPOSED OF

CAPTAIN S. L. BREESE, COMMANDERS E. W. CARPENDER AND S. B. WILSON, SURGEON B F. BACHE, AND PURSER E. T. DUNN,

CONVENED, BY ORDER OF

THE SECRETARY OF THE NAVY,

AT THE U. S. NAVY YARD, NEW YORK, IN NOV. 1851.

FOR THE PURPOSE OF EXAMINING AND TESTING CERTAIN ALIMENTARY VEGETABLE SUBSTANCES, AND PREPARED MILK.

U. S. Navy Yard, N. York,
Monday, Nov. 10th, 1851.

Minutes of the proceedings of a board convened by order of the Hon. Secretary of the Navy, dated October 30, 1851, for the purpose of examining and testing certain alimentary vegetables, and prepared milk, with a view to their adoption as part of the navy ration.

All the members being present, and the Board organized, the order of the Secretary of the Navy was read, together with the various reports and papers which had been communicated by the Commandant of the New York Naval Station, for the information and guidance of the Board, after which it was determined to remove the articles to be reported upon, to the Naval Hospital for experiment; that place furnishing greater facilities for the purpose than the Navy Yard. Board adjourned to meet to-morrow at 10 A. M.

Tuesday, Nov. 11th, 1851.

Board met pursuant to adjournment, all present. It proceeded to inspect the contents of the boxes submitted, which were found to agree with the list supplied by the Bureau of Provisions and Clothing, with the exception, that a paper of potatoes prepared by Masson's process, was not found. The several packages were in good order, except that two bottles were found broken, viz: one of Carrots, and one of

Mushrooms. Their contents, however, appeared to have sustained no loss as to quantity, nor deterioration as to quality, from this cause. The Board then proceeded to examine and to experiment upon the articles submitted to it, commencing with those prepared by Masson's process.

Experiment 1. A tablet of Choux—cabbages—of five rations, put up in tin foil, presented the appearance of a consolidated mass of leaves of a pale straw color, variegated with green, having a pungent, peculiar, and unpleasant odor, not resembling that of the fresh plant; it weighed 4 oz. 12 dr. avoirdupois—after soaking in 2 pints of water at 92° of Fahrenheit, for 70 minutes in a covered vessel, it weighed 22 oz. 8 dr., having gained by the process 1 lb. 1 oz. 12 dr.; the quantity of water remaining not absorbed was seven-eighths of a pint. This water was yellowish, and had the taste and odor of boiled cabbage. The time of soaking in this instance was more protracted, because after it had been carried on for a considerable time it was found that in consequence of the density of the tablet, the water had not penetrated into the interior. The tablet was then broken up, by removing successively the layers of leaves, and the soaking was then continued, until the purpose to be attained was supposed to be effected. The cabbage was placed then in a covered saucepan, the water drained from it returned, together with an additional quantity amounting in all to eight and a half pints. The vessel was placed on a cooking range, over a good anthracite fire, when it was speedily brought to the boiling point, at which it was maintained until it was considered to be prepared for eating. The time employed in cooking was two hours and fifty-one minutes; it was then removed and carefully drained, after which its weight was found to be 2 lbs. 5½ oz.

The article had now assumed very nearly the appearance of boiled fresh cabbage, with which it was compared. The odor and taste were similar; it differed from it only in being yellower, tougher and more saccharine. After having been seasoned with butter, pepper and salt, it was found to be an agreeable article of food.

Experiment 2. A tablet of Carrots—carottes—of five rations, enclosed in tin foil, on being uncovered, presented neither the color nor odor of the recent root. The color

was too pale—The odor differing but slightly from that of the cabbage (Ex. 1.) The management with this article was similar to the preceding, and the various facts connected with it, will be found noted in the annexed table, Form A. After cooking, this vegetable was found to have resumed its color, odor, and taste nearly, the color not so bright as in the fresh root—the taste more saccharine. Having been seasoned, the article was agreeable to the taste.

Experiment 3. A tablet of Turnips—navets—(Masson) of five rations, the foil, being removed, shewed a dense mass of transverse slices of the root, pressed together—whitish, with an odor much resembling the preceding articles. The experiments with it were conducted on the same plan, [see Table A.] After soaking, the water remaining was colored yellow—after cooking, the slices had a faint taste of the turnip, and were tough and leathery. From their appearance when filled out by absorbed water, they were supposed to be taken from a small and inferior species of the root. When seasoned, they were not as palatable as the preceding vegetables.

Experiment 4. A tablet of Julienne, (Masson,) of five rations, cased in foil, when uncovered, presented nothing worthy of note—it was treated as the preceding, [see Table A.] The water remaining after soaking had the color, flavor and odor of the Julienne prepared from fresh roots. The mass appeared to consist of carrots, cabbage, and turnips only. After the soup was cooked, it differed from the Julienne with which the Board was familiar, in the absence of meat only.

Board adjourned to meet to-morrow at 10 A. M.

U. S. Naval Hospital,

Wednesday, Nov. 12th, 1851.

Board met pursuant to adjournment. All present.

Experiment 5. A tablet of Chicorée—succory—(Masson) of five rations, cased in foil, was uncovered. It was of the color of straw-paper, variegated with green. It was treated similarly to the preceding vegetables. [Table A.] After soaking it did not recover its fresh appearance, the water remaining was brown and imbued with the bitter flavor

of the plant. After protracted boiling, it remained tough, yellowish, unpalatable, and unfit for food.

Experiment 6. A tablet of Persil—parsley—(Masson,) put up in foil, when uncovered, resembled a mass of dead leaves of the plant. The odor, although resembling that of the preceding preparations, retained the character of the fresh plant sufficiently to distinguish it. The tablet was of a uniform dark green. After soaking, it regained the appearance of the recent leaf, with but little of its flavor. The water remaining was strongly imbued with the taste and odor of ordinary parsley—the leaves when filled out by absorbed water were found to be of an inferior variety of the plant. [Table A.]

Experiment 7. A tablet of Haricots verts—string beans—(Masson) put up in foil, when opened was of a dark green color, with a peculiar but not unpleasant smell. After long soaking, they had not resumed the appearance of the fresh bean, and it was only after protracted boiling that they became tender. They were then seasoned, and were found palatable, and well tasted, although inferior in flavor and tenderness to the recent bean. [Table A.]

Experiment 8. A bottle of Petit pois—green peas—(Masson) of five rations. The contents had an obscure dark green color, and were contracted—not so much so however, as to promise a very great increase from the absorption of water. After long soaking and cooking, they were filled out, and were found to be agreeable and palatable, but less highly flavored, and somewhat tougher than the fresh pea.

Board adjourned to meet to-morrow at 10 A. M.

U. S. Naval Hospital,

Thursday, Nov. 13th, 1851.

Board met pursuant to adjournment. All present.

All the preparations by Masson's process having been submitted to experiment—soaking them in water as a preparatory step to cooking, with a view to test the practical value of this preliminary maceration, it was determined to proceed with portions of some of the articles prepared by this process, by simply placing them in cold water, and exposing them to heat over the cooking range—placing them for the first half hour, over the end of the range, when the tem-

perature would not reach quite as high as the boiling point, and removing them afterwards to the middle of the range, until the vegetable should be perfectly cooked.

Experiment 9. A tablet of Choux—cabbages—(Masson) of five rations, in all respects similar to that used in the first experiment—was treated in the manner described above. It weighed, on being uncovered, 5 oz., and was placed in a saucepan with six pints of water at the temperature of the air—about 58°—In two hours and thirty minutes from the time of immersion, it was considered to be sufficiently cooked. In color, taste, and tenderness, it was much superior to that in which the preliminary soaking had been used. [Table A.]

Experiment 10. A tablet of Carottes—carrots—(Masson) of five rations, similar to that used in the experiment No. 2, was treated as in the preceding experiment. The contrast between the result obtained from this method and those of Experiment 2 was very striking—so much so indeed, as to give the impression to the Board, that the quality of the tablets must be different. The cooked carrot, furnished by this experiment, could in no respect be distinguished from the well prepared recent root. [See Table A.]

The Board proceeded to examine the Gannal preparations.

Experiment 11. The contents of a bottle of Champignons—mushrooms—(Gannal) which had been found broken in the box, but to all appearance unchanged, was put into boiling water, and soaked for ten minutes—care being taken to preserve the temperature from much depression. At the end of this time the remaining water was of a dark brown color—with the taste and odor of the mushroom—which also had their natural taste in some degree, but were quite tough. They were then cooked for an hour and a half, when they were found to be still tough—flavor natural but faint—color good. [Table A.]

Experiment 12. Tapioca Français—pure potato—(Gannal) had a whitish yellow appearance, with short cylindrical portions, as if the mass from which it was prepared had, before drying, been forced through circular orifices. Seven ounces of the tapioca were put into two and one-fifth pints of boiling water, well stirred, and then boiled for ten minutes. There resulted a semi-fluid, resembling in color

and consistence thin mush, made from yellow corn meal. The taste resembled that of the fresh root, but could be distinguished from it. [Table A.]

Experiment 13. This article was then treated in the same quantity, seven ounces, with one pint of water, with the view of obtaining it, when cooked, of the consistency of ordinary mashed potato. The process was conducted in the same manner. The result was better, and more nearly resembled mashed potato—a portion of the mass, which was in contact with the bottom of the vessel, was slightly burned. [Table A.]

Experiment 14. For the purpose of comparing the two preparations, Edwards' Preserved Potato was next experimented upon. It presented the appearance of a coarse white powder, with a darkish green tinge, with some black specks in it. Twelve ounces of it were added to a quart of boiling water, and well stirred, and the vessel was kept warm for ten minutes. The result was a semi-fluid of the consistence of thin mush, made of white corn meal, interspersed with dark specks and spots. It had an uncooked and unpleasant taste, like that of decayed potato. [Table A.]

Experiment 15. Twelve ounces of the same preparation were added to a pint of boiling water, to obtain a thicker product. The resulting mass was too thick and tenacious, and had the same unpleasant taste and bad color. The impression of the Board from these two experiments was that the sample of Edwards' Preserved Potato, submitted to them, had been prepared from diseased or decayed material.

Experiment 16. A tin case of conserve of milk—(de Lignac) was opened, and found to contain a white, soft, solid mass. A portion was diluted with five times its bulk of warm water. It formed a milk-like fluid, with the flavor of rich boiled milk, much sweetened. A portion of the conserve, sufficient to make half a pint of milk, was set apart to be analysed, in order to compare the result with that obtained from an equal quantity of cows' milk. [See paper B.] A portion was set aside, to observe the effect of being kept exposed to the air.

Experiment 17. A portion of a tablet of consolidated milk, which was received from the Navy Yard, two months ago, for trial, was examined. It had been exposed to the at-

mosphere ever since it had been at the Hospital, and appeared to be in no degree rancid, or impaired from that cause. A quantity of it was grated, and the powder dissolved in warm water. The resulting liquid was thought more closely to resemble unboiled milk than the preceding—and to have less artificial sweetening. The analysis of 100 grs. troy, of this article, will be found in paper marked B.

Board adjourned, to meet to-morrow at 10 A. M.

U. S. Naval Hospital,
November 14th, 1851.

Board met pursuant to adjournment, all present.

Experiment 18. A tablet of Carottes—carrots—(Masson) of five rations, in all respects like those used in experiments 2 and 10, was treated by the mode laid down by Gannal; it was soaked in salted water of the temperature of the air for seven hours, and then boiled for an hour. The result could in no respect be distinguished from the properly cooked recent root. [Table A.]

Experiment. 19. A tablet of Navets—turnips—(Masson) of five rations, was treated in the same manner; the result was watery, tasteless, and without odor. The root from which the preparation had been made, seemed as in the other experiments, to be of an inferior kind. [Table A.]

Experiment 20. A tablet of Choux—cabbages—(Gannal) covered with paper, was opened; it was a mass of large, dull, yellow colored leaves, not so tightly pressed as those of Masson—the odor was very unpleasant. On separating the leaves, it appeared to be carelessly prepared. An entire carrot and a large piece of cotton string were found in the interior of the package. The inner part was moist, and thought to be slightly mildewed. One hundred grains of the leaves, taken from the interior of the package, after having been exposed to a temperature of 88° for twenty-four hours, was found to have lost six and a half grains in weight. The package weighed one pound ten ounces; it was soaked for two hours in six pints of water at 96°, and afterwards boiled in twenty-eight and two-sixteenths pints, for an hour and fifty-five minutes, when it appeared to be well cooked. It was found to be tender, but with little taste. Its color was yellowish white. [Table A.]

Experiment 21. The contents of a bottle marked Julienne, composed of ten varieties of vegetables—(Gannal)—for twenty-four persons, weighed one pound two ounces; it was boiled for two hours and three-quarters in a mixture of twelve pints of stock soup, with thirteen pints nine and a half ounces of water. The soup had the flavor, in a high degree, of the vegetables of which it was composed, and was agreeable. The vegetables, except the cauliflower, were tough, and did not improve in this respect from protracted boiling. [Table A.]

Experiment 22. A package of Oseille—sorrel—(Gannal,) put up in paper, was of a yellowish green color. The leaves were packed in layers, with slips of paper intervening; it had a peculiar unpleasant odor. Three ounces and two drachms were put into cold salted water and boiled for fifty-two minutes, when it was found to be perfectly cooked; the dark green color of the leaf was restored; it was tender, and had the taste of the vegetable, but not in a high degree. [Table A.]

Experiment 23. The contents of a bottle of Chou fleur—cauliflower—(Gannal,) was of a yellowish-white appearance. Two ounces and two drachms were put into four and an eighth pints of water, at the temperature of the air, and boiled for fifty minutes, when it was found to be well cooked; it was tender and palatable, much resembling the recent vegetable in these respects. The color was unchanged. [Table A.]

Experiment 24. The contents of a bottle of Haricots verts flageolets—bunch beans—(Gannal,) had very much the appearance of the ordinary bunch bean when matured, but was lighter; ten and a quarter ounces were put into five pints of cold water and boiled for two hours and forty minutes, when they were found to be tender and palatable, nearly as much so as the fresh bean. [Table A.]

Experiment 25. The Betteraves—beets—(Gannal) consisted of several transverse sections of the root, of a deep red color, very light from exsiccation. They were loosely wrapped in paper, and had some minute fragments of glass adhering to them, from which it was inferred they had originally been packed in a bottle, which had been broken. Two ounces and nine drachms were put into a mixture of cider

vinegar and water, a pint of each, at the temperature of the air. It was soaked for thirteen and a half hours; the color of the root was freely imparted to the acidulated water; the root was tender and pleasant to the taste, but resembling in appearance and flavor, beets that had been kept out of the ground for a length of time. [Table A.]

Board adjourned, to meet on Monday, the 17th instant, at 10 A. M.

U. S. Naval Hospital,
Monday, Nov. 17th, 1851.

Board met pursuant to adjournment. All present.

Experiment 26. The contents of a bottle of Carottes—carrots—(Gannal) which was found broken in the box, consisted of longitudinal split portions of the dried root, retaining its natural color and taste. Five ounces of it were soaked in two and a half pints of salted water, at 58°, for fourteen hours and fifty minutes; the weight after maceration was one pound five ounces and four drachms, the water remaining measured one pint and seven-sixteenths; they were then cooked for an hour and ten minutes in four pints and seven-sixteenths of water, when they were found to weigh one pound nine and a half ounces. They had recovered very nearly the natural appearance and flavor of the cooked recent root. [Table A.]

Experiment 27. The contents of a bottle of Navets—turnips—(Gannal) consisted of longitudinal portions of the root dried and contracted. Six ounces was soaked in two and a half pints of salted water at 58° for eight hours; they imparted a dull orange color with the odor of the root to the water remaining, which amounted to one pint and seven-sixteenths. The weight of the root when soaked was one pound five ounces and a half; it was then cooked in two pints and seven-sixteenths of water for thirty-five minutes, when being sufficiently done, its weight was found to be one pound eight ounces and a quarter. The flavor was good and they were tender. [Table A.]

Experiment 28. The contents of a bottle of Chicorée—succory—(Gannal) consisted of small fragments of leaves of a pale greenish-yellow appearance; it was boiled in cold water until cooked; it was tender; color unchanged; taste unpleasant. [Table A.]

Experiment 29. A package of Persil—parsley—(Gannal,) consisted of thin layers of pressed bunches of sprigs of the plant, separated by slips of paper; color dull yellowish-green; a portion was soaked in cold water for three hours; the water restored the size of the leaves, but they did not recover their odor, taste, nor color. [Table A.]

Experiment 30. The contents of a bottle of Choux de bruxelles—brussels cabbages—(Gannal,) consisted of a number of small heads of the vegetable of their natural form. A portion was cooked in cold salted water; it recovered its color; was tender, except the cut part of the stem, and was very palatable and pleasant. [Table A.]

Experiment 31. The contents of a bottle of Epinards—spinage—(Gannal,) consisted of a coarse powder of the leaf, of a green color; a portion was boiled in salted water till it was well cooked; it had the color and taste of the cooked recent plant. [Table A.]

Experiment 32. A quantity of Ognon—onion—(Gannal) was loosely enveloped in paper, retaining its natural appearance, with some of the odor. After soaking, the odor was much stronger; when cooked, the odor and taste were strong; but they were stringy and tough. [Table A.]

*Experiment 33. To ascertain whether these desiccated vegetables could not be supplied with water and cooked by the vapor arising from sea water, in the process of cooking salted meats, thereby saving fresh water and fuel, and preserving the sapid and soluble matters, which were found to be in some degree lost by maceration and coction—a portion of choux—cabbages—(Masson,) was exposed to a current of steam in the dry state, upon a perforated metallic plate, in a large vessel connected with a still; at the end of an hour some of the leaves were found to be cooked, while the remainder were softened and turned brown, but had absorbed but little water. At the end of five hours and thirty-five minutes they were all thoroughly cooked. They had a sweetish taste and a brown color. It is to be observed that the apparatus used in this experiment was not well calculated for the purpose. The perforated shelf was so large that but a small portion of it was covered by the leaves, so that the steam had a free escape without coming in contact with them. [Table A.]

* See note at page 16.

U. S. Naval Hospital,
Tuesday, November 18th, 1851.

Board met pursuant to adjournment. All present.

Experiment 34. A paper of Pomme de terre—potato—(Masson) received from the Bureau of Provisions and Clothing, consisted of hard, dried, transverse slices. After being soaked in warm water they were cooked and found to have the flavor of the potato in a high degree, and to be a very pleasant article of food. [Table A.]

The specimens from the can of Edwards' Preserved Potato, furnished for experiment, having produced such unsatisfactory results as to color, odor and taste, the Board was disposed to believe that this article had been prepared from diseased or defective roots, and that it did not fairly represent the article; a portion of the same preparation was therefore obtained from another can.

Experiment 35. Fifteen ounces of it were thrown into three pints of water at 138° and soaked for forty minutes. The resulting mass had a good color and consistence, but a crude, unpleasant taste, and a bad odor. To endeavor to remove these, the mass was exposed to the boiling temperature for ten minutes over a water-bath, but with no advantage as to the result. The specimen from this second can was of a pale yellowish color, with less of the greenish tinge than was observed in the article used in experiments 14 and 15. The Board is of opinion that the contents of both the cans examined were prepared from defective potatoes. [Table A.]

The Board then proceeded to the examination of several tin cases, containing respectively flour, rice, beans and raisins.

Experiment 36. Two cubical* tin boxes, measuring within a very small fraction of twelve inches each side, and marked "Experimental Flour, Stafford's Process, April 30, 1850. To go out in the Relief and be returned to the Navy Yard, New York," were examined. The cans were found in perfect order and well soldered—so that their contents were preserved from exposure to the air. Upon opening them the flour looked well, but in both it was sour. An attempt to prepare bread from a portion of it was made. The result was heavy and sour, and dark.

*The cubic tin cans cost each forty-five cents; the cylinders thirty-eight cents.

Experiment 37. A cylindrical* tin can, seven and a quarter inches in length, and seven and an eighth inches in diameter, and marked, "Raisins put up in tin on trial, not to be opened until fifteen months from this date, October 30, 1850. The condition of the raisins is then to be reported to the Chief of the Bureau of Provisions and Clothing. E. W. Carpender,"—was examined. The box was in good order and well soldered. The raisins, weighing four and a half pounds, were found of good quality and in excellent preservation in all respects, except that a few of them were slightly candied.

Experiment 38. A similar tin can to the preceding, marked "Rice," with the same directions as were found upon the can of raisins, was found to be in good order. The rice contained in it weighed nine and a half pounds, and looked well; it was quite free from insects, but had a slight musty smell. On being cooked, it proved to be perfectly sound and good.

Experiment 39. A can similar to the preceding, marked "Beans," with the same directions, was found to be in good order. On opening it was found to contain seven pounds nine ounces of white beans, and a small tin box not soldered, with thirteen and a half ounces of a different and larger variety of white bean. Those in the outer box did not look bright, and had an unpleasant odor as if they were beginning to decay; on being cooked they did not prove good. Those in the inner can appeared to be in perfect condition in every respect. On being cooked they were found to be sound and good, but they required long boiling.

Board adjourned, to meet on Monday, the 24th November, at 10 A. M.

U. S. Naval Hospital,
Monday, Nov. 24th, 1851.

Board met pursuant to adjournment. All present.

The Board proceeded to inspect the can of Conserve of Milk, opened on the 13th instant, and set aside to be exposed to the action of the air. It was found to be highly rancid, having very much the appearance and odor of rancid tallow.

*The cubic tin cans cost each forty-five cents; the cylinders thirty-eight cents.

The Board having completed the examination of the several articles submitted to it, and having recorded the experiments made, and their results in the minutes of its proceedings, and tables A and B, respectfully report:

1. That of the articles examined, the cabbage, carrots, and potatoes of Masson appear to be most suitable for serving out in cruising vessels, as a part of the diet.

2. That these articles, in the opinion of the Board, promise to be highly valuable to crews engaged on long voyages, or under circumstances when supplies of fresh vegetables cannot be obtained.

3. That the Board cannot recommend the substitution of these articles for any of the component parts of the existing ration, with the exception, possibly, of cheese.

4. That in view of the difficulty that may be found in cooking these preparations properly, on ship board, and of the prejudice against their introduction as food, that may arise among the men, the Board would recommend, that for the purpose of determining how far these objections may be valid, one ration of either of the above-named desiccated vegetables be served weekly, in addition to the existing ration, for a time sufficient to determine these points.

5. That many of the other desiccated vegetables would form useful and agreeable articles of food, for the officers' messes, of cruising vessels.

6. That the conserve of milk, of de Lignac, although an excellent imitation of milk, so far as taste is concerned, appears from analysis, to differ from it in important respects, and does not promise to be valuable as an article of diet, for medical use—and the Board does not recommend its adoption for this purpose.

Note.—One of the difficulties in the introduction of desiccated vegetables, as an article of diet in the Naval service, is the increased consumption of fresh water and fuel requisite for their preparation, agreeably to the directions of the manufacturers.

It is believed that the expenditure of both may be dispensed with, and the cooking thoroughly effected by a modification in the construction of the coppers ordinarily used on ship-board.

Let a shallow vessel with a seive-like or perforated bottom be fitted over the top of the copper, so as to be clear of the water which may be required for boiling the salted meats. Upon this bottom the desiccated vegetable is to be placed in a thin but equable layer. The vessel closely covered by its lid is then to be fitted into its place. The meats and cold sea water first having been introduced into the copper. The fire is to be slowly raised; as soon as the water becomes warm it will throw off vapor, which, being condensed by the diaphragm and lid, will be absorbed by the vegetable furnishing it with the requisite amount of fresh water to bring it to the proper condition for cooking. After the water attains the boiling point, the steam evolved will cook the vegetable without soaking out from it the sapid matter, as is the case in a degree when boiling in water is resorted to.

Should difficulty be experienced in practice in moistening the dry vegetable sufficiently by vapor, this part of the process may be performed by immersion in fresh water; the moistened vegetable can then readily be cooked by steam in the manner proposed.

TABLE A.

No. of exper'nt.	ARTICLE.	Weight in the dry state. (Avoirdupois) lb.	oz.	dr.	Quantity of water used for soaking. Pints.	Tem. of water. Fah.	Duration of the soaking. h.	m.	Weight after soaking. lb.	oz.	dr.	Water remaining after soaking. Pints.	Increase of weight. lb.	oz.	dr.	Quantity of water used in boiling. Pints.	Time of cooking. h.	m.	Weight when cooked. lb.	oz.	dr.
1	Choux—Cabbages (Masson)	.	4	12	2	92°	1	10	1	6	8	$\frac{7}{8}$	1	1	12	$8\frac{1}{2}$	2	51	2	5	8
9	do do.	.	5	.	..	.	.	.	.	.	.	..	.	.	.	6	2	30	.	.	.
33	do. do.	.	4	8	..	.	.	.	.	.	.	..	.	.	.	Steamed.	.	.	.	.	.
2	Carottes—Carrots do.	.	4	6	1	91	1	.	1	1	8	$\frac{1}{4}$	.	13	2	$2\frac{3}{4}$	1	50	1	9	4
10	do. do.	.	4	13	..	.	.	.	.	.	.	..	.	.	.	4	2	25	.	.	.
18	do. do.	.	5	.	salt water	58	7	.	1	6	.	..	1	1	.	6	1	.	1	12	.
3	Navets—Turnips do.	.	4	14	2	92	.	35	1	5	.	1	1	.	2	5	2	.	2	5	.
19	do. do.	.	4	4	salt water	58	7	.	2	.	12	..	1	12	8	6	1	5	2	3	.
4	Julienne do.	.	4	15	2	92	.	45	1	7	8	$\frac{13}{16}$	1	2	9	9	3	5	.	.	.
5	Chicorée—Succory do.	.	4	6	3	90	.	50	1	8	8	$1\frac{3}{4}$	1	4	2	8	4	.	2	3	.
6	Persil—Parsley do.	.	2	4	2	90	1	.	.	14	12	$1\frac{1}{4}$	.	12	8	..	.	.	.	.	.
7	Haricots Verts—String Beans do.	.	2	9	2	91	1	.	.	9	.	$1\frac{9}{16}$	.	6	7	10	4	5	1	3	.
8	Petit Pois—Green Peas do.	.	5	.	2	89	1	2	.	11	.	$1\frac{11}{16}$	.	6	.	2	3	45	.	12	4
34	Pommes de terre—Potato do.	.	10	8	3	138	.	40	1	5	12	2	.	.	.	..	.	25	1	13	12
20	Choux—Cabbages—Gannal	1	10	.	6	96	2	.	5	11	.	$2\frac{2}{16}$	4	1	.	$28\frac{2}{16}$	1	55	11	1	12
26	Carottes—Carrots do.	.	5	.	$2\frac{1}{2}$ salted	58	14	50	1	5	4	$1\frac{7}{16}$	1	.	4	$4\frac{7}{16}$	1	10	1	9	8
27	Navets—Turnips do.	.	6	.	$2\frac{1}{2}$ salted	58	8	.	1	5	8	$1\frac{7}{16}$	.	15	8	$2\frac{7}{16}$	.	35	1	8	4
21	Julienne do.	1	2	.	$4\frac{6}{16}$	.	.	.	.	.	.	..	.	.	.	gravy 12 wat. $13\frac{9}{16}$	2	45	.	.	.
28	Chicorée—Succory do.	.	2	14	..	58	.	.	.	.	.	..	.	.	.	$4\frac{6}{16}$	1	15	1	9	12
29	Persil—Parsley do.	.	.	.	..	58	3	.	.	.	.	..	.	.	.	..	.	.	.	.	.
12	Tapioca Français—Pure Potato do.	.	7	.	..	.	.	.	.	.	.	..	.	.	.	$2\frac{1}{3}$	.	10	.	.	.
13	do do. do.	.	7	.	..	.	.	.	.	.	.	..	.	.	.	1	.	10	.	.	.
22	Oseille—Sorrel (Gannal)	.	3	2	..	.	.	.	.	.	.	..	.	.	.	salt water	.	52	1	1	4
23	Chou Fleur—Cauliflower do.	.	2	2	..	58	.	.	.	.	.	..	.	.	.	$4\frac{1}{8}$ salt	.	50	.	13	.
24	Haricots Verts Flageolets—Bunch Beans do.	.	10	4	..	.	.	.	.	.	.	..	.	.	.	5 salt.	2	40	1	10	4
11	Champignon—Mushrooms do.	.	.	.	..	.	.	10	.	.	.	..	.	.	.	..	1	30	.	.	.
30	Choux de Bruxelles—Brussels Cabbage do.	.	1	2	..	.	.	.	.	.	.	..	.	.	.	$4\frac{6}{16}$ salt	.	45	.	6	4
31	Epinards—Spinage (Gannal)	.	2	4	..	.	.	.	.	.	.	..	.	.	.	3 salt	.	30	1	8	12
25	Betteraves—Beets do.	.	2	9	vinegar 1 water 1	58	13	30	.	10	8	..	.	.	.	..	.	.	.	.	.
32	Ognon—Onion do.	.	2	12		58	1	.	.	8	12	..	.	.	.	..	.	20	.	13	4

TABLE A—Continued.

No. of ex.	ARTICLE.	Quantity experimented with. lb.	oz.	dr.	Quantity of water used. Pints.	Tem. of water. Fah.	REMARKS.
14	Edwards' Prepared Potato	.	12	.	2	212°	Well stirred and kept warm for ten minutes.
15	do. do.	.	12	.	1	212	do. do. do.
35	do. do	.	15	.	3	138	Exposed to temperature 212° for ten minutes in water bath.

NOTE.—The Litre is equal to about one pint and three-quarters, imperial measure, and to two pints and a fifth wine measure.

TABLE B.

Analysis of fresh Cows' milk, conserve of milk, (de Lignac,) and consolidated milk, made by James Beatson, Apothecary to the U. S. Naval Hospital, New York.

ARTICLE.	Quantity analyzed, troy weight.	Fatty matter.	Casein.	Sugar, extracts, and salts.	Loss.	Specific gravity of milk.
Extract of Cows' milk half a pint, of the consistence of the conserve.	720 gr.	190 gr.	106 gr.	172 gr.	water. 152	1,034
Conserve of milk, de Lignac.	640 grs.	32 gr.	218 gr.	340 gr.	water. 50 gr.	1,040
Consolidated milk in cake.	100 grs.	4	23	62	11	

Remarks.—The fatty matter from the cows' milk was evidently butter. That from the conserve appeared to be some animal fat, not natural to milk, perfectly white in color.

The sugar from the conserve, was evidently, for the most part, cane sugar.

NAVY DEPARTMENT,

May 6th, 1851.

Surgeons Bailey Washington,
George Clymer, and
Joseph Beale,

Gentlemen:—The Chief of the Bureau of Provisions and Clothing, having requested the Department to detail a Board of Medical Officers for the purpose of examining various alimentary vegetable substances prepared by the process of desiccation in Europe, and used in the French and English Navies:—You are hereby constituted a Board, to examine such articles as may be submitted to you by the Chief of the Bureau of Provisions and Clothing. You will assemble in Washington on the 12th instant, and make a full report to the Department on the subject at as early a period as practicable.

Very respectfully,

Your obedient servant,

WILL. A. GRAHAM.

Note.—Of these vegetables it is only known that the "Preserved potato" of Messrs. Edwards is at present used in the English service.

REPORT OF A BOARD

COMPOSED OF

SURGEONS B. WASHINGTON, GEORGE CLYMER,

AND JOS. BEALE,

CONVENED BY ORDER OF THE

SECRETARY OF THE NAVY,

AT WASHINGTON CITY, IN MAY, 1852.

FOR THE PURPOSE OF EXAMINING CERTAIN DESICCATED ALIMENTARY VEGETABLE SUBSTANCES, &c.

WASHINGTON, *June* 24th, 1852.

SIR:

We have the honor to make the following report in conformity with your order of the 6th ultimo, directing us to examine such dried alimentary substances as would be submitted to us by the Chief of the Bureau of Provisions and Clothing, and to make a full report to the Department on the subject.

We assembled in Washington on the 12th ultimo, and daily thereafter until we completed the examination, which was made with great care and exactness.

The following articles were submitted to us by the Chief of the Bureau of Provisions and Clothing.

1st. Those prepared by Masson's process were compressed, were in the form of tablets of about four inches square by one-half inch thick, and covered with tin foil, and were as follows, viz:

4 tablets of Cabbages—Choux—viz: 2 of 5 rations, and 2 of ten each.
3 " Carrots—Carottes—of 5 rations each.
2 " Turnips—Navets—of 5 rations each.
4 " Julienne—composed of different vegetables for Soup—2 of 10 rations and 2 of 5 rations each.
1 " Succory—Chicorèe—of 5 rations.
1 " Parsley—Persil.
4 " String beans—Haricots Verts.
2 bottles of Green Peas—Petits Pois—not compressed, of 5 rations each.
1 paper of Potatoes—Pommes de terre—in separate slices not compressed.

On each of the above tablets was the following in French: "Before cooking, soak for a half hour or longer in warm water, in a covered vessel."

2d. Those prepared by Gannal's process were not compressed, were either in bottles closed with corks and thick tin foil, not air tight, or in a covering of white paper, and were the following:

1	bottle of	Carrots—Carottes.
2	"	Turnips—Navets.
1	"	Julienne—consisting of 10 different kinds of vegetables.
1	"	Succory—Chicorée.
2	"	Potato—Tapioca Francais.
2	"	Bunch Beans—Haricots Verts Flageolets.
1	"	Cauliflowers—Choux Fleurs.
1	"	Mushrooms—Champignons.
2	"	Brussels' Cabbages—Choux de Bruxelles.
1	"	Spinage—Epinards.
1	package of	Cabbages—Choux.
1-2	"	Parsley—Persil.
2	"	Sorrel—Oseille.
1	"	Beets—Betteraves.
1	"	Onions—Ognons.

3d. "Preserved Milk," (conserve de lait,) prepared by M. de Lignac, of France, three tin canisters, weighing each, in the average, 1 lb. 8 oz. 13 dr.; avordupois English, gross.

The following is the direction (in French) on each canister: "To obtain milk, it is necessary only to dilute a part of the conserve with five times the quantity of warm water, and then to boil it."

4th. "Preserved Potato" of D. & H. Edwards & Co., of London, 2 tin cases, containing 56 lbs. and 28 lbs.

The printed direction for its use is, "to about three-quarters of a pound of the Patent Preserved Potato, add one quart of boiling water, stirring it at the same time; cover it closely, and to prevent chilling, the basin or vessel used should be kept hot; let it stand for ten minutes, then well mash, adding salt, butter, &c., at pleasure."

That our report may embrace all the information in our possession, in relation to these alimentary substances, and present the whole subject in the most intelligible form before the De-

partment, we deem it proper, before making a statement of our examination and experiments, to submit an abstract of the valuable information relating to them, contained in certain papers that have been placed in our hands by the Chief of the Bureau of Provisions and Clothing.

No. 1. The first of these is a report (extracted from the annals of the Central Horticultural Society of France, 1851,) dated the 5th April, 1851, of a Committee of the Central Society of Horticulture of France, on the processes of desiccation, reduction, and preservation of vegetable alimentary substances, by M. E. Masson.

From this Report it appears that there is established in Paris, at No. 5 Rue Marbeuf, under the direction of Messrs. Chollet & Co., a manufactory for the preparation, by the processes of M. Masson, of vegetable substances, with which the French Navy and Commercial Marine are furnished.

The establishment consists of, first, a room for washing and picking the vegetables; 2nd, a large drying room fitted with shelves and sieves, for the spreading, shaking and turning of the vegetables during the drying, and supplied with dry air at a temperature of 35° to 38° centigrade (95° to 100° Fahrenheit,) and from which the moist air is discharged through chimneys; and 3d, a storehouse for depositing the dried vegetables. After this, they are subjected to pressure, formed into tablets of a certain size, wrapped in tin foil, and then packed in tin cases for preservation, and for sending away.

Each tablet weighs 500 grammes, sufficient for twenty rations of twenty-five grammes each, which, by cooking, regain the weight of 150 to 180 grammes, according to the kind of vegetable. Each tin case contains five kilogrammes of dried vegetables, sufficient for two hundred rations, and costs twenty-five francs—25,000 rations can be shipped in the space of a cubic metre.

We would here remark that the French gramme is equal to $15\frac{4}{10}\frac{4}{00}\frac{4}{00}$ grains Troy; that the French kilogramme (or 1000 grammes) is equal to 2 lb. 3 oz. 5 dr. avordupois; that the French metre is $39\frac{3}{10}\frac{7}{00}\frac{7}{00}$ English inches; and that the French franc is eighteen and three-fourth cents.

A note by M. Masson, appended to this part of the printed report of the Committee, gives the following results of experiments made at the manufactory, to satisfy the enquiries of the committee.

820 kilogrammes of green spinage were reduced by picking, (an operation performed by 30 women in one day,) to 639 kilogrammes. These 639 kilogrammes, exposed during 22 hours, in the drying room of the manufactory, to the heat produced by the burning of 250 kilogrammes of charleroy coal, were reduced to 71 kilogrammes in the dry state; 568 kilogrammes of water having consequently been evaporated.

920 kilogrammes of curled green cabbage, picked in one day by 30 women, gave, after picking, 725 kilogrammes, which exposed in the drying room, for 28 hours, to the heat produced by the consumption of 300 kilogrammes of coal, gave 69 kilogrammes of dry cabbage; 656 kilogrammes of water having thus been evaporated.

500 kilogrammes of carrots, picked, weighed after complete desiccation in the drying room, 50 kilogrammes; the reduction of weight being, consequntly nine-tenths.

550 kilogrammes of turnips, picked and sliced, lost, in 25 hours, 500 kilogrammes of water, leaving 50 kilogrammes of dried vegetables.

All the fleshy roots lose about the same weight. Pears and apples lose only six-sevenths of their weight by desiccation.

7 hectolitres of potatoes, weighing 455 kilogrammes, gave, after peeling, 283 kilogrammes of heart of potato, which were reduced by drying, to 57 Kilogrammes; that is

1 hectolitre of	raw potatoes	weighed 65	kilogrammes,
"	peeled	40	"
"	dried	8	"

8 kilogrammes of potatoes, unpeeled, gave 2 kilogrammes of dry potatoes, having lost by desiccation 75 per cent. of their weight.

The Horticultural Committee pronounce the opinion that the desiccating process of M. Masson preserves vegetables, particularly legumes, without altering their constitution, and reduces them to a very small bulk without impairing their flavor, or nutritive properties. Desiccation carries off the water not necessary to their constitution, and which in some vegetables, such as cabbages and roots, exceeds 80 per cent. of their weight when fresh,—compression reduces their volume, increases their density to that of deal, and thus facilitates their preservation, stowage, and transportation.

To use the vegetables, prepared by the processes of M. Masson, it suffices to steep them 30 or 40 minutes, in tepid water in a covered vessel, or 6 or 8 hours in cold water; when they will have resumed with most of the water they had lost, their fresh appearance; particularly cauliflowers, which from a yellow tint, return to all their original whiteness. They may then be cooked, and seasoned as the same vegetables when fresh.

Numerous experiments made by committees appointed by the Minister of Marine to examine the dried vegetables of M. Masson, with reference to the question of their introduction into the Naval Service, (an abstract of whose reports will be presented under No. 5,) attest the good quality and complete preservation of these productions after a shipment of 4 years. Thus, a chest of cabbages, shipped the 29th of January, 1847, on board the Corvette, the Astrolabe, and opened in the early part of January, 1851, containing cabbages, merely dried and *not pressed*, being served out, 200 grammes of the cabbage, "after having soaked during an hour in warm water, absorbed at first 850 grammes of water; then, having been cooked for two hours, their weight rose to 1300 grammes; after which, prepared with butter and lard, they made a dish of excellent taste." (Report of the Naval Committee, 6th March, 1851.)

According to another Committee, a tablet of cabbage *compressed*, and 10 centimetres ($3\frac{9}{10}\frac{3}{10}\frac{7}{10}$ English inches) square and two centimetres thick, and wrapped in tin foil, weighed in the gross, 145 grammes, and contained 130 grammes of dried cabbage in a volume of 200 cubic centimetres, which correspond to a density of 650 kilogrammes to the cubic metre. This cabbage absorbed six and a half times its weight of water by both soaking in warm water and boiling. The flavor was thought excellent.

A third report proves that the julienne, the spinage, &c., prepared by the same processes, gave dishes that were pronounced perfect. The Committee are of opinion, likewise, that these cabbages should be substituted in the Navy, not only as a relish in place of *sauer kraut*, but also at regular meals instead of the usual allowance of beans and dry vegetables. They add that the expense of desiccation, by the process of M. Masson, ought not to equal that of preparing the

sauer kraut, or the cost of beans, and that, as to bulk, it would be much less, in the case of M. Masson's cabbages, than in that of the latter articles.

M. Masson's processes of preservation are applied, with entire success, to most vegetables and to several fruits. Thus, all cabbages, spinage, parsley, cress, chervil, succory, and sorrel are dried and pressed to a very small volume. It is the same with carrots, turnips, parsnips, celery, salsify, and viper's grass, which are cut in thin slices, and into small pieces to make julienne. Cauliflowers, Brussels sprouts, asparagus and string beans, in order to resume their natural appearance, should not be pressed. Potatoes are perfectly preserved in thin slices. Peas and beans in a green state also, are succeeded with very well; as are, likewise, truffles, mushrooms, onions and leeks, which should, however, be cut into small pieces. Lastly, various fruits also, and especially apples and pears in slices, are dried and keep perfectly.

The Horticultural Committee conclude their Report by enumerating the benefits to result from this new branch of industry, and by proposing to their Society to felicitate M. Masson on the perfection of his processes, and M. M. Chollet & Co., on the completeness of their establishment, and the quality of the products there prepared.

No. 2. Abstract of a Report, made on the 19th of May, 1851, to the Academy of Sciences of the Institute of France, by a Committee of the Academy, on the processes of M. Masson, Chief Gardener of the Central Horticultural Society of France, for preserving alimentary vegetable substances.

The Committee state that, in these processes, devised by M. Masson, and executed at the establishment of M. M. Chollet & Co., No. 5, Rue Marbeuf, the operations, few and simple, consist in carefully picking the vegetables, removing their hard parts, laying them on frames of light linen canvass disposed on lattice shelves in a drying room, exposing them there, for a time sufficient to remove the water not necessary to their constitution, to dry air, at 48° centigrade (118°.4 Fahrenheit) for the more watery vegetables, admitted by a pipe, whilst the moist air is discharged by orifices communicating with chimneys, and in subjecting them, thus dried, to the powerful compression of the hydraulic press.

The Committee made two experiments at the establishment; one on broccoli, the other on spinage, as follows:

920 kilogrammes of broccoli, reduced by picking, by 30 women in one day, to 725 k., spread on 710 canvass frames, and exposed for 28 hours in the drying room, to a temperature of 40° to 48° centigrade, (104° to 118°.4 Fahrenheit) were reduced to 69 k., of dry matter; having thus lost 656 k. of water, or over 90 per cent. of their former weight, evaporated by 300 kilogrammes of charleroi coal.

820 kilogrammes of spinage, picked in one day, by 30 women, and thus reduced to 639 k., placed on 710 canvass frames in the drying room, were reduced, in 22 hours of warming at 40° to 48° centigrade, (104° to 118°.4 Fahrenheit) to 71 k. of dry matter; having thus lost 568 k. of water, or 89 per cent. of their weight, or rather more than seven-eighths; the consumption of coal having been 250 k.

Thus in these two experiments, the enormous proportion of seven-eighths of their weight has been taken from fresh vegetables; that which constitutes the great importance of M. Masson's process.

Pressure by the hydraulic press, then, further reduced the volume so as to render the stowage the easiest possible, and to bring the density to 500 or 600 kilogrammes the cubic metre.

As to the quality of the products, and the almost perfect preservation of their flavor, the Committee of the Academy refer to several Naval Reports, an abstract of which will be given presently, and cite, in detail, the Report, dated April 7th, 1851, of a Committee, formed in the port of Cherbourg, by order of the Maratime Prefect, to examine the products offered by M. M. Chollet & Co., and prepared by the processes of M. Masson.

After the Cherbourg Committee had assured themselves, by examination, of the good condition, appearance, and odor of the products presented for experiment, they immersed them in warm water in covered vessels, weighed them before and after immersion, and thence determined the quantity of water absorbed.

The results of these well made observations are stated in the following table:

Kind of Vegetable.	Weight before immersion.	Temperature of the water.		Duration of immersion.	Weight after immersion.	Relation of the weights before and after immersion.
	Grammes.	Cen.	Fahr.		Grammes.	
Cabbage	280	50°	122°	33 m.	1.480	5.30
Chervil	73	45	113	30	324	4.44
Brussels Sprouts	139	50	122	38	630	4.53
Celery	130	50	122	41	510	3.93
Spinage	87	45	113	30	475	5.47
Julienne	142	50	122	40	741	5.22
						4.81

Thus, after immersion these vegetables regained the greater part of the water which they contained before desiccation.

The Report of the Committee at Cherbourg, shows that these vegetables had resumed also their original flexibility and their natural color, and that their forms were so well preserved in some of them, particularly in the chervil and the Brussels sprouts, that they looked as if they had just been gathered. The taste and smell were, also, in a great degree, developed by the soaking.

The cooking of all these vegetables required from an hour and a quarter to an hour and three quarters; and, after having seasoned and tasted them, the Cherbourg Committee unanimously declared that all were very good, but that the spinage and Brussels sprouts had a marked superiority over the others, and might have been mistaken for fresh vegetables; thus showing, in the opinion of the Committee, that, by the process of M. Masson, the drying of vegetables may be performed without injury to their taste, smell, color, nutritive properties, or wholesomeness; the very reverse of all which takes place in the method of drying usually adopted.

A subsequent examination of potatoes and carrots produced the same satisfactory results, and proved, moreover, that immersion previous to cooking was not necessary.

The Cherbourg Committee conclude their Report, with the following summary of results, viz. :—

1st. That vegetables, dried by the process of M. Masson, are in a state of perfect preservation.

2d. That they offer, by very simple means, wholesome and agreeable provisions.

3d. That it would be most advantageous to use them on ship board instead of the beans now in use.

4th. That it would be advisable not to abolish altogether the sauer kraut, but to alternate it with the cabbage ; thus obtaining all the advantages of a mixed diet.

5th. That it would be extremely advantageous to apply the new process to potatoes and carrots for the provisioning of the Navy.

6th. That it is proper to reserve for the sick, and for those who find their own provisions, the celery, the Brussels cabbage, the julienne, and the spinage.

7th. That the vessels of the fleet should not alone benefit by this new invention ; but that it should be used in such of our Colonies as have not the advantage of fresh vegetables.

8th. Lastly, that, in order to solve the problem of the preservation of vegetables, the Committee recommend that there be sent to as many ships as possible, particularly to those navigating the tropical seas, an assortment of the vegetables prepared by M. Masson.

In view of this unanimous accord of all the Naval Committees, and of the trials made by the Committee of the Academy themselves, they entertain no doubt of the success of M. Masson's processes for the preservation of alimentary vegetable substances ; and, in view of the service which these processes are destined to render to the military and commercial marine and to the army, the Committee think that they merit all the encouragement of the Academy.

No. 3. The third paper is a Report, dated Brest, May 21st, 1851, by a Naval Committee, and states the results of their experiments on various dried and pressed vegetables of M. Masson, as follows :

Name.	Quantity.	Temperature of water of immersion.		Time of immersion.	Weight after immersion.	
	Grammes.	Cen.	Fahr.		Grammes.	Deca.
Parsley	20	35°	95°	35 m.	52	2
Chervil	20	35	95	35	53	5
Cabbage	248	35	95	38	630	
Brussels Sprouts	130	35	95	29	440	
Celery	125	35	95	33	445	
Julienne	96	35	95	38	374	
Colewort	104	35	95	64	374	
Salsify	130	35	95	38	515	
Spinage	135	35	95	39	462	

The Committee are of opinion that all the above mentioned vegetables except the Celery, might be used as diet for the sick and convalescent, and that the cabbages alone can be supplied to the *rationed* in the Navy for a relish, or in place of sauer kraut, and sorrel. They do not think that the cabbages can be given to the sailors as a dish instead of beans, peas, and faiols; for 53 parts of beans, 68 of faiols, or 80 of peas, are equivalent in nutritive matter to 100 of cabbage perfectly dried.

No. 4. The fourth paper is a Report, also, of a Naval Committee, dated Toulon, 25th June, 1851, setting forth the results of their experiments on seven kinds of vegetables, dried and pressed, eight months previously, by M. Masson's processes, and in the form of tablets, 11 centimetres square and 2 thick, and wrapped in tin foil. Stripped of the foil, they were found perfectly dry, with the odor of the fresh vegetables.

The following table gives their weight before, and after, immersion for 37 minutes in tepid water :

	Before Immersion.		After Immersion.	
	K.	Grammes.	K.	Grammes.
Cabbage	0	120	0	760
Spinage	0	124	0	846
Celery	0	120	0	520
Julienne	0	119	0	630
Chervil	0	067	0	280
Brussels Sprouts	0	133	0	610
Potatoes	0	100	0	465

Thus, the weight, from soaking, was increased 5 1-4 fold and the volume 8 or 10 fold, that is, returned to the natural state; the physical character, of which desiccation had deprived them, reappearing at the same time.

They all, when cooked, gave dishes scarcely distinguishable from those of the fresh vegetables.

The Masson processes of desiccation and compression offer to the Navy the double advantage of supplying the want of fresh vegetables, and of packing, in a small compass, a quantity of rations more considerable than that represented by the dry vegetables.

The conclusions of the Committee are, 1st. That the vegetables, dried according to the Masson process, offer suitable food for the sustenance of the crews;

2d. That cabbages and potatoes can be introduced into the composition of the ration in place of the dry vegetables delivered for suppers and for meat dinners;

3d. That beans, for which the crews generally have a repugnance, can be suppressed, and replaced by Cabbages and potatoes;

4th. That, without proscribing peas and faiols, there would be room for alternating these vegetables with cabbages and potatoes;

5th. That the sauer kraut and sorrel can be kept up, reducing the quantity;

6th. That the other vegetables, such as celery, julienne, spinage, should be embarked on board ship for the use of invalids only;

7th. Finally, that it is necessary, before modifying the ali-

mentary system of the crews, to subject to trial at sea the results obtained by the Committee.

No. 5. The fifth paper contains 4 Reports (referred to under No. 1), made by Committees appointed by the Minister of Marine, to examine certain of the vegetables dried and preserved by the processes of M. Masson, with reference to their introduction into the Naval service. These Reports, an abstract of which we here subjoin, concur in attesting the good quality and complete preservation of these vegetables.

1st. The first of these four Naval Reports, dated Paris, April 15th, 1850, relates to the subject of desiccated cabbage, and the effects of immersion. It states that 160 grammes of perfectly dry cabbage, prepared about 15 months before, by M. Masson, were steeped in tepid water for 30 minutes, at the end of which time, being filled out to nearly the size of fresh cabbage, and their weight being increased seven fold, they were put into hot water, and boiled for three hours. Seasoned with salt and pepper, the Committee found them very good, with nearly all the flavor of fresh cabbage.

The Naval Committee think that this cabbage might be used for the sailors at sea, not only as a relish in place of sauer kraut, but as a *meal*, instead of the beans served out for supper, and of the 60 grammes of dry vegetables given at salt dinners. The quantities to be given might be in the following proportions:

As a relish instead of sauer kraut, - - - - - - -	040	grammes.	soaked cabbage.
For supper instead of beans	200	"	" do.
For salt dinners, - - -	100	"	dried do.

The Naval Committee add that the expense of the dried cabbage is less than that of sauer kraut, and also of beans, which latter French sailors eat with very great repugnance.

As to stowage, they say, it would occupy less room than sauer kraut and beans; for there can be packed in a cubic metre ($29\frac{3}{10}\frac{7}{00}\frac{1}{0}$ English inches,) 400 to 450 kilogrammes of dry pressed cabbage leaves, which, when soaked, represent 3,200 to 3,600 kilogrammes of the fresh, which afford 16,000 to 18,000 rations, at 200 grammes each.

The Naval Committee is of opinion, likewise, that the great pressure, undergone by the cabbage, must preserve it

from the penetration of moisture, and that its enclosure in wooden boxes, well made, and of a convenient size for easy stowage, would ensure its keeping. This opinion is confirmed by the trial made in the Corvette, the Astrolabe; where a box of M. Masson's unpressed cabbage was opened after more than a year's cruising, when the cabbage was found perfectly preserved, and to be, when cooked, of a pleasant savor and good taste.

The Naval Committee conclude their Report with the recommendation that there be placed on board of two large vessels, one of which should belong to the Senegal station, a quantity of these cabbages sufficient for trial, and for determining, at the same time, if the amount of water required for cooking this new aliment is in relation with the resources of the vessels.

2d. The second of the above mentioned Naval Reports is dated Paris, the 11th day of February, 1851. It states the results of three trials, by the Committee, on a box of M. Masson's *unpressed* cabbage, which had been nearly four years on board the Astrolabe in the La Plata. The box was of tin, set in one of wood. It was 31 centimetres long, 15 broad, and 16 high, and contained 785 grammes of *unpressed* dried cabbage. The cabbage appeared quite dry, and was yellow, and of a sourish smell.

In the first trial, 250 grammes, soaked for an hour in warm water and drained, weighed 1250 grammes, and, after an hour's boiling, weighed 1600 grammes. The sourish smell, which had been increased by the soaking, disappeared entirely on boiling. The boiled cabbage had a perfectly natural and agreeable taste, but was hard and little cooked, attributed to the water of immersion having, perhaps, been too warm, and to the boiling's having been for only an hour.

In the second trial, 200 grammes, steeped for an hour in water exactly tepid, gave 1050 grammes, which a two hours' boiling increased to 1300 grammes. Dressed with butter and lard, they made an excellent dish; the cabbage being very well cooked, the large stalks alone being rather hard.

In the third trial, 100 grammes, cooked, for at least three hours, in weak broth, differed scarcely perceptibly from fresh cabbage.

From these trials, the Naval Committee draw the following results, viz. :—

1st. M. Masson's process succeeds in preserving dried cabbage for nearly four years, provided that it be packed, without pressure, in a metal box hermetically closed.

2d. The immersion in tepid water, for one hour, causes the absorption of much liquid, and the swelling of parts of the vegetables, which resume their original form and consistence.

3d. The cooking should be continued for two or three hours.

4th. The vegetable when cooked, weighs about six and a half times as much as when dry.

5th. Properly cooked it has given satisfactory results, having a pleasant taste, much like that of the fresh cabbage.

The Committee remark that the bulk of this *unpressed* dried cabbage is much too great for them to recommend its use on ship board. They are aware, however, that M. Masson proposes to subject to the hydraulic pressure quantities of the dried cabbage, and to form it into tablets, which in a small volume, shall represent a considerable weight. Whilst reserving, therefore, their opinion on this mode of preparation and its preservation by some other means than in tin cases, they would not hesitate, except from considerations of economy, to recommend its general adoption in the Navy, provided that the advantages resulting from smallness of bulk, great facility of stowage, and the use of cases less expensive than those of tin, should not have been procured at any injury to the quality of the vegetable.

3d. According to the third of the Naval Reports, dated Paris, 6th March, 1851, the tablet of M. Masson's *compressed* dried cabbage experimented on was 10 centimetres ($3\frac{9}{10}\frac{3}{00}\frac{7}{00}\frac{1}{00}$ English inches) square, and 2 centimetres thick.

The weight of the tablet, in its tin foil covering, was - - - - - - 145 grammes.

The weight of the tin foil covering, - - 015

The net weight of the cabbage, - - - 130

60 Grammes of this cabbage, immersed for one hour in water at 35° centigrade, (95° Fahrenheit) and drained, weighed 355 grammes, which, after two hours boiling, increased to 380 grammes; a six-fold increase after immer-

sion, and a six and a half fold after boiling. The taste was pronounced excellent, showing that the dried and *pressed* cabbage of M. Masson retained the flavor and other qualities of the fresh.

4th. The fourth Naval Report, dated Paris, March 14th, 1851, sets forth that 200 grammes of "Julienne," immersed for 12 minutes in water at 35° centigrade, (95° Fahrenheit) and drained, gave 960 grammes, which, seasoned with butter, pepper and salt, and cooked for an hour, made a very good soup ; the vegetable being tender and of a pleasant flavor.

It states, also, that 100 grammes of spinage, placed for 20 minutes over a fire, in a skillet containing boiling water, and then drained, weighed 620 grammes—dressed with butter and placed again over the fire for 30 minutes, they found a delicious dish, differing in no appreciable respect from fresh spinage.

No. 6. Remarks of M. Gannal on the vegetables desiccated by his process, with his directions for cooking them.

The quantity of water and sap contained in a vegetable varies considerably with the kind, the part, and the period of vegetation.

In order to preserve dried vegetables from changes of temperature, humidity, dust and insects, M. Gannal places the choice and costly ones in glass vessels, and those for the crew in boxes lined with zinc.

As to the cooking, they should, with few exceptions, be put into cold water properly salted.

The fire should be moderate at the beginning, and should not cause boiling until after one quarter of an hour.

Cabbages should be steeped in luke warm water for two hours before cooking.

Carrots and turnips should be steeped in salted cold water for six or eight hours.

Potatoes, termed French Tapioca, should be thrown into boiling water, whether for soup or being mashed.

A summary of M. Gannal's statistics is presented in the following table, in which the first column of figures gives the number of grammes in one litre of each vegetable ; the 2d, the cost per kilogramme in francs and centimes ; the 3d, the cost per litre *with the glass flacon containing it ;* and the 4th, the number of rations in each litre.

A Litre is $61\frac{0}{1}\frac{2}{0}\frac{5}{0}\frac{8}{0}$ *English cubic inches.*

A Hectolitre is $6,102\frac{1}{1}\frac{8}{0}$.

A Kilogramme (or 1000 grammes) is 2 lb. 3 oz. 5 dr. Avoirdupois.

A Franc is $18\frac{3}{4}$ cents.

A Centime is the 100th part of a franc.

	Grammes in 1 Litre.	Cost per Kilogramme.		Cost per Litre.		Rations in 1 Litre.
		F.	C.	F.	C.	
Julienne	500	3	20	2	80	24
Green Cabbage		1	05			
Red Cabbage		1	40			
Milan Cabbage		1	05			
Brussels Cabbage	120	3	45	1	20	4
Cauliflower	200	4	15	2	20	4
Green Peas	600			4	00	24
French Tapioca	500		30			10
Turnips	160	1	75	6	00	$3\frac{1}{5}$
Succory	180	2	00	1	40	4
Spinage	160	1	80	1	65	
Sorrel	160	1	80	1	65	$3\frac{5}{9}$
Carrots	350	2	05		80	7
String Beans		7	60			
Flageolet Beans	860			1	40	8
Pumpkin	250	1	00	1	15	
Beets		2	00			
Mushrooms				5	00	

The julienne of M. Gannal is composed of ten different vegetables, and contains, in every 127 grammes, (a quantity sufficient for a soup for six persons,) the following, viz :— White beans 20 grammes, cauliflower 10, leeks 5, peas 20, celery 5, carrots 20, turnips 15, chervil 2, cabbage 15, and string beans 15.

None of the articles of M. Gannal have been pressed ; although he expressed his intention to adopt that method with most of them.

No. 7. The 7th paper is a Report, dated Toulon, April 17th, 1849, of a Naval Committee, on the subject of preserved milk (conserve de lait), prepared by a process invented by M. de Lignac.

The milk, of the consistence of a soft paste, is contained in tin canisters, which weigh about 800 grammes each, and of which the tin weighs 175 grammes. On exposure to the air for 15 days, the milk lost 15 grammes. The Committee made several trials with the milk, by adding a certain quantity of it to four times its weight of warm water, and boiling it for a few minutes, with the invariable result of producing a homogeneous milk, pure, natural and agreeable ; in a word, entirely similar to boiled fresh milk sweetened ;—although, in one instance, the milk had, before the experiment, been exposed to the air for a week ; and, in another instance, for two weeks.

The Committee assured themselves of the keeping properties of the preserved milk, by exposing two open canisters (from which part of the milk had been removed for the experiments,) to the air, for two and three weeks, respectively, with the result of finding, in both instances, that the milk continued in a state of perfect preservation at the end of that time.

With such facts before them, and after unsuccessful comparative trials with the "lait double," the Committee is of opinion that the "conserve de lait" of M. de Lignac is superior to all other preparations of milk hitherto used in the Navy, and should be substituted in place of the "lait double" now in use.

As respects the question of economy, the Committee state the cost at 6f. 50c. the kilogramme of the concentrated milk, or 1f. 30c. the kilogramme of the diluted milk, that is, 24$\frac{5}{10}$ cents for 2 lb. 3 oz. 5 dr. of milk, of the ordinary density and richness. The concentrated milk contains, in every kilogramme (1000 grammes), 150 gr. of sugar, put in to preserve the milk.

It must be remarked here that the Committee diluted the preserved milk with only 4 times its weight in water; whereas M. de Lignac directs 5 times the weight of water to be used in order to reduce it to the consistency of common milk.

No. 8. The eighth paper is a Report, dated Nov. 5th, 1849, of a Committee of the Academy of Sciences of the Institute of France, in relation to a memoir of M. de Lignac, on the product of milch cows, and the fabrication of preserved milk (conserve de lait.)

The Committee state that M. de Lignac, with a view to assure the concentration and preservation of milk, without depriving it of any of its constituents, fulfils the following conditions:

1st. He procures milk of excellent quality, obtained during the pasturing season, not employing that of stable-fed cows.

2d. The quantity of milk to be prepared at one time, is obtained from nearly simultaneous milkings, so as to avoid exposing it to spontaneous alterations.

3d. It is concentrated in a flat, shallow vessel; the depth of the milk not exceeding 2 or 3 centimetres (.78742 or 1.18113 English inches).

4th. The heat, applied for evaporation and concentration, is communicated by steam circulating in a double envelope, so as not to raise the temperature of the milk to the boiling point.

5th. 75 to 80 grammes of white sugar per litre of milk, (about 3 ounces to the quart) are in the first place dissolved in it, as an antiseptic and a condiment.

6th. The evaporation of the milk, thus sugared, is hastened by constant stirring.

7th. When reduced to two tenths of its original volume, the milk is poured into cylindrical tin canisters, containing each a half litre, or a litre; (nearly a quart) and the canisters are closed by soldering the covers with bands of tin that may be cut around so as to open the canisters without difficulty.

The preserved milk, thus prepared, has already received the sanction of extensive use, and has been introduced into the Navies of France and England.

From opportunities of comparing, at the end of voyages, M. de Lignac's "conserve de lait" with the "lait double," till then used in the French Navy, the Committee think the former not subject to the changes and decomposition which the latter undergoes.

The "Conserve de Lait" is a paste, with the odor of boiled milk. It mixes easily with warm water, and, when boiled with 4 times its amount of water, it has the composition and all the properties of common milk boiled; so that, in tea, coffee and chocolate, it would be difficult to distinguish them from those containing common boiled milk sweetened.

The "Conserve de Lait," exposed in an open canister for 15 days, gave, on trial, similar results to those above stated.

It appears from the above that the "Conserve de Lait" is susceptible of long preservation ; and it is hence, in the opinion of the Committee, especially applicable to the provisioning of the Navy.

The Chief of the Bureau of Provisions and Clothing states, in a series of "observations," with which he accompanied the submission of the above enumerated papers to the Board, that "this preparation of milk has superseded, in consequence "of its superior quality, all other preparations of milk, and "is the only kind used in the French and English navies "and hospitals ; M. de Lignac having the contract for sup- "plying both Governments."

No. 9. The only remaining paper, submitted to us from the Bureau of Provisions and Clothing, touching the subject of our Report, and requiring a notice in this place, is a printed pamphlet filled with testimonials to the excellence of the "Preserved Potato" of Messrs. D. & H. Edwards & Co., of London.

Of these testimonials, five are from the distinguished chemists Brande, Ure, Daniell, Paris and Taylor, who express the opinion that the "Preserved Potato" is pure and without admixture; that it may be kept for any length of time without liability to decay or change in any climate ; that its comparative nutritive powers are to those of the fresh potato as about four to one ; that the process for its preservation is, chemically considered, the best possible ; that it is a wholesome and agreeable preparation of the nutritious parts of the root, not distinguishable in flavor (when cooked according to the printed directions accompaning it) from fresh and well boiled mealy potatoes ; that it contains all the nutritious properties of those vegetables ; that it is well adapted as an article of food ; and that it is a very good substitute for the fresh root.

Of the other testimonials, which are very numerous, many are in the form of special Reports required by, and made to, the British Government, by Surgeons of the army and navy, on foreign stations, many of them in charge of Hospitals in the East and West Indies, and all bearing, in the most ample and satisfactory manner, one uniform and positive testimony to the "Preserved Potato" as a valuable, nutritious, and agreeable article of diet to the sick and the well, retaining

all its original qualities without change for years, and being very valuable to sailors and soldiers in long voyages and on stations where vegetables are scarce and of inferior quality, and as having in several instances been found an excellent antiscorbutic.

The rest of the Pamphlet is filled with testimonials from commanding officers in the military and mercantile Marine, all certifying as to the keeping properties of the "Preserved Potato," and as to its great value as an addition to a ship's stores, particularly on a long voyage.

The "Preserved Potato" is packed in 1 cwt. metal cases, and is also supplied in 56 lb., 28 lb., and 14 lb. cases, containing, according to the Messrs. Edwards, in a concentrated form, the equivalent of five times those quantities of the vegetable. It is offered for sale at a price that makes the vegetable, when cooked, as cheap as potatoes in the ordinary state.

After this summary of facts and opinions touching the articles submitted for our examination, we proceed to lay before the Department a statement of our examinations and experiments; in making which we conformed to the directions given by the preparers of the substances; and also, in order to arrive at the most satisfactory results, we repeated most of the experiments, varying the manner of making them.

EDWARDS' "PATENT PRESERVED POTATO."

The two specimens of this article submitted to the Board for examination were in heavy tin cases, well adapted to transportation, and marked with the quantity in each.—Printed directions for preparing the vegetable for table use, and testimonials as to its value, from Brande, Ure, Paris, and a number of army and navy surgeons and others, accompanied it. In the experiments about to be detailed, the Board have conformed to the directions in the strictest manner, except where it is expressly stated to the contrary.

According to these, boiling water, in the proportion of about two parts of water to one of potatoes, is to be poured upon

the latter; and, after being well stirred, the mixture is to be allowed to stand in a warm place for 15 minutes. Then mash the potatoes well, season with salt and butter to suit the taste, and the process of cooking will be completed. Dr. Ure has repeated the experiment, observing the proportions recommended by the inventor; but he states that it is preferable to employ *three* times, instead of *twice*, the quantity of water.

Before proceeding to the trials designed to be made with this article, the Board examined it very carefully in the crude state, and found the samples taken from the two cases not to present any appreciable marks of difference. One description, therefore, of their physical qualities will apply to both. When opened, the contents of the cases appeared in the form of small, rough granules, of a dirty whitish color, with specks of a black substance interspersed (probably the eyes carelessly left in preparing the root,) and imparted a faint odor and taste of boiled potatoes. The taste, however, was more bitter, and the smell ranker. Intermixed with the larger grains were some smaller ones, and also a considerable quantity of powdery matter, which seemed to result from the attrition of the larger granules. The contents of both cases were perfectly dry, and as free as possible from mustiness of smell.

Experiment 1. Upon ¾ lb. of the potato, taken from the small case marked as containing 28 lbs. net, was poured one quart of boiling water. The mass having been sufficiently incorporated by stirring, the vessel containing it was covered and set by a hot fire for ¼ hour. When mashed, it had a dirty whitish color, an unpleasant earthy smell, and a disagreeable bitter taste, resembling that of the worst varieties of the yam. The black specks, alluded to in the description of the crude vegetable, were now very conspicuous, and gave a mottled aspect to the mixture. The consistency of the mass was about that of mashed boiled potatoes, but rather more watery. Seasoning with salt and butter partially removed the bad taste and smell, but left the compound still very unlike, and vastly inferior to, the recently cooked fresh root. When the preserved potato, after being thus dressed, was further baked in small cakes, its flavor underwent great improvement, and as-

similated it much nearer to the vegetable as usually prepared for the table.

Experiment 2. One quart of boiling water was, in like manner, poured upon ¾ lb. of the potato from the large case marked as containing 56 lbs. net, and the mass treated as in the preceding experiment. The result differed in no respect from the former.

Experiment 3. One pound of potato taken from the small case, was next treated with 3 lbs. of boiling water, (these being the relative proportions advised by Dr. Ure,) and the residue of the process was conducted, as in the two former experiments, with no appreciable difference in the results.

Experiment 4. The same quantity of the potato from the larger case, treated with the same proportion of boiling water, gave the like product.

This concluded our experiments with Edwards' "Patent Preserved Potato." Judging from these results, as well as from the sensible qualities of the substance as it existed in the two cases, the Board have not been able to form other than a low estimate of its value as an article of food for the navy. Cooked in whatever mode, it was still disagreeable to the palate, the nose, and the eye, and induced us to think that the samples we examined must have been manufactured from tubers which were in a diseased state at the period of gathering them. It was evidently an exceedingly common, crude, and unwholesome preparation.

As we are nowhere informed of the process by which the "Preserved Potato" of the Messrs. Edwards' is prepared, we can obviously form no opinion, in the absence of specimens prepared from sound and carefully selected roots, of the probable qualities of the substance if prepared from such roots. The article, as it was submitted to us, was so *inferior* in every particular, that we cannot approve it.

MASSON'S
DESICCATED VEGETABLE ALIMENTARY SUBSTANCES.

These are directed to be prepared for table use, by first immersing them in lukewarm water for half an hour, or in cold for six or eight hours, and then boiling them over a brisk fire, from 1¼ hour to 3 hours, according as the time required for cooking the vegetables in their natural state is longer or shorter. After undergoing a thorough cooking, they are to be well drained, and then seasoned with butter, salt, or other condiment, according to circumstances. They are said to be now fit for the table. These directions have been fully complied with in the trials which the Board made with the articles of M. Masson.

POTATOES—POMMES DE TERRE.

The sample submitted to the Board was contained in an open paper, and had been exposed to the weather for a length of time. It appeared in transverse slices, with some of the eyes still in them, of a horny texture, and about a line and a half in thickness. The color was a dull yellow, the odor faint, and the taste mawkish. The fracture of the pieces was sharp and corneous. The specimen bore a decided resemblance, in general appearance, to slices of the fresh root dried at a moderate temperature; though, in reference to taste and smell, the dissimilarity was quite as decided. It was in a remarkably dry state, notwithstanding the prolonged exposure to the air.

Experiment 5. Two ozs. of the potato, after having been immersed in a pint of hot water about an hour, had swollen a little and become softer, though still quite tough and leathery. The water was somewhat discolored, and had, in a slight degree, the odor and taste of raw potatoes. When drained, they were found to weigh $3\frac{6}{8}$ ozs., and the water left from immersion to measure 13 ozs. To the water of immersion was added a sufficiency of fresh water of the temperature of the air to make a pint. In this the potatoes were boiled for an hour; at the end of which time the pieces were found still distinct, and could, with difficulty, be mashed into a homogeneous mass. They were much charred, and ad-

hered to the sides of the vessel used in cooking; this not proceeding from any neglect on our part to watch the process, but from the quantity of water being too small. Notwithstanding this unfavorable termination of the experiment, the general appearance, odor, and, in a less degree, the taste, of the substance somewhat resembled those of roasted potatoes. The weight was 3 ozs.

Experiment 6. The same quantity, immersed in 1 pint of water at 65° F., was found at the end of 2¼ hours, hard, leathery, and but slightly swelled. The water of immersion retained scarcely any distinctive character; it measured 14 ozs. The potatoes, when well drained, weighed $3\frac{5}{16}$ ozs. They were next boiled 1 hour in two pints of water, (including that used in immersion;) and, at the end of the process, it was found that the whole of the water had been dissipated. Their weight was 7 ozs. All of the pieces were separate; and some could not be reduced to the consistency of mashed potatoes. That portion which was susceptible of being mashed, was seasoned with butter and salt. It then tasted, smelt, and looked precisely like the uncharred portions of the first product.

The taste of this substance, prepared in both ways, was *disagreeable* in a marked degree. This, coupled with its bulkiness, forbids the introduction of the article into the navy for the subsistence of the men; though, in the opinion of the Board, it is far from being so bad a preparation as the specimens of potato, submitted to us, of the Messrs. Edwards.

CABBAGE—CHOUX.

Experiment 7. A tablet of 5 rations, in good condition and perfectly free from moisture. On removing the tin foil in which it was wrapped, the tablet was found to be composed of the closely compressed leaves and stems of the plant. On breaking it open, the interior exhaled a pleasant aromatic odor, and had, when chewed, a sweetish mucilaginous taste; both resembling those of fresh cabbage. The color of the leaves was dull yellow, mingled with a bright green; and, being in a fine state of preservation, with their veins and nerves quite distinct, they looked very much like the fresh vegetable. The tablet measured 4 inches square by ¾ in thickness, and weighed $4\frac{5}{16}$ ozs. net. This was immersed, after having been

picked to pieces, for ½ hour, in 2 quarts of water at 90° F. At the end of that time it was removed from the water, and suffered to drain thoroughly. It now weighed $1\frac{5}{16}$ lb., was swollen, and had become softer; but it was still tough, crackled between the teeth when masticated, and bore a greater resemblance than before to boiled fresh cabbage. The water of immersion measured 3 pints, and was of the color of weak brandy and water, with the flavor of cabbage, but more sweetish. Boiled in 7 pints of water, (including that of immersion,) it became necessary, in 2¼ hours, to add two quarts of boiling water, to save the cabbage from being burnt. The boiling consumed 3½ hours, and was done over a very hot wood fire. Drained and weighed, the vegetable went up to 1 lb. 13½ ozs. Still it could not be said to be cooked enough; because, whilst the smaller leaves were moderately soft and tender, the large stems and thicker leaves remained tough and leathery. In appearance, taste, smell, &c., however, it resembled boiled fresh cabbage very much. The water left after cooking was dark colored and turbid, smelt and tasted strongly of cabbage, and was found to measure 1¾ pints.

Experiment 8. Cabbage—Choux. An oblong tablet of 10 rations formed the subject of this experiment. In sensible qualities and mode of packing, it did not differ materially from that just described. Its net weight was $7\frac{6}{16}$ ozs., being considerably less than the weight of two of the smaller tablets, although it was marked to contain twice as many portions as either of them. The whole tablet, well picked into small pieces, was immersed for ½ hour in 5 quarts of water at 90° F. When drained, it weighed $2\frac{5}{16}$ lbs.; and presented the same properties as in the former instance. The water of immersion measured 6 pints. Boiled for 3½ hours in 2½ gallons of water, (including water of immersion and 1 gallon added during the cooking,) it weighed, when drained, 3 lbs. 1¾ ozs., was somewhat softer, less leathery, and altogether better done than in the preceding trial. The water left after cooking, amounted to 2½ pints. Well seasoned with salt and butter, both specimens furnished a dish which evidently only needed to be better cooked, to be *very palatable* to those fond of the vegetable. It was clear, however, to the Board that boiling for nearly four hours over a most intensely hot fire, and the liberal employment of water, had not sufficed to bring either

specimen to a state which might be safely pronounced digestible.

CARROTS—CAROTTES.

Experiment 9. A tablet four inches square by one-half thick, containing 5 rations, and weighing $4\frac{13}{16}$ ozs. net, was next subjected to experiment. Its state of preservation was of the best; and it had evidently been kept quite dry. It was composed of thin slices, resembling the fresh plant in color, taste, and smell; but these qualities were all fainter and feebler than in the latter. The entire tablet being separated, and immersed in 3 pints of water at 110° F. for one-half hour, was found, when taken out and drained, to weigh 1 lb., to be much swollen, and tough, and to have the sweetish taste of carrots. The water of immersion measured $2\frac{3}{16}$ pints, had the same taste of carrots, and resembled the serum of the blood in color. It was now boiled in 3 pints of water, (including that of immersion;) but two pints of boiling water had to be added before the process was over. In $2\frac{3}{4}$ hours the vessel was removed from the fire, and the carrots drained. They now weighed 1 lb. $9\frac{3}{4}$ ozs., and were not softened enough for use, though tasting and smelling strongly like the fresh vegetable. The water from cooking measured 4 ozs., and was sweetish, and of a pale straw color.

Experiment 10. Carrots—Carottes. A tablet, precisely like the former in its general aspect, but weighing only $4\frac{13}{16}$ ozs., was, after separation, immersed for half an hour in two pints of water at 78°. It then weighed $13\frac{1}{2}$ ozs., and the water measured $1\frac{1}{2}$ pints. The carrots were less swollen and harder than in the preceding experiment. They were next boiled in half a gallon of water, (including that of immersion;) but 3 pints of boiling water were added before the conclusion of the process. In $2\frac{3}{4}$ hours the water had all disappeared, leaving the carrots better cooked than the first specimen, and manifesting most of the physical qualities of the fresh vegetable. Their weight amounted to 1 lb. $11\frac{1}{2}$ ozs. With seasoning of salt and butter they made, for a vegetable not thoroughly cooked, a good dish.

In neither case were the carrots as thoroughly done as they ought to be, to constitute a perfectly palatable and digestible article of food. If this objection could be removed by longer

boiling, or by boiling in contact with other vegetables, or with bacon, as it probably could be, the Board would pronounce them an *excellent* dish, recalling, in a high degree, the qualities of the fresh plant, and valuable, under many circumstances, on board ship.

TURNIPS—NAVETS.

Experiment 11. Turnips—Navets. The subject of the present experiment, were in the form of a tablet of 5 rations, which weighed $5\frac{1}{16}$ ozs., and measured $4\frac{3}{4}$ inches square by $\frac{3}{4}$ thick. It was composed of slices, having a dull yellowish color, and somewhat of the smell and taste of the fresh vegetable; the latter being perhaps rather more sweetish. Though perfectly dry throughout, it appeared to be swollen, as if the damaged condition of its coating of tin foil had permitted the imbibition of water; and it was certainly larger and more heavy than the tablet of 5 rations employed in the succeeding experiment. Separated, and immersed for half an hour in 3 pints of water at 110° F., it was found to weigh $1\frac{9}{16}$ lb., to be swelled, and to have the taste and smell of turnips. It was also very tough. The water of immersion had a sweet taste, high color, and measured $1\frac{1}{2}$ pints. After $3\frac{1}{4}$ hours constant boiling over a brisk fire in 6 pints of water, increased during the process by the addition of 2 gallons of boiling water, the turnips weighed 1 lb. $11\frac{3}{16}$ ozs., and the water, left after draining, amounted to half a pint. The turnips were only tolerably done, not readily mashed into a uniform mass, and possessed the smell and taste of the fresh plant to a very limited degree. The water of immersion was of the color of brandy and water, but dirty.

Experiment 12. This tablet measured $4\frac{1}{2}$ inches square by one-half thick, and weighed net $4\frac{13}{16}$ ozs. It exactly resembled the previous specimen in appearance, &c., &c., and was moreover in the dryest state. Separated, and immersed half an hour in 3 pints of water at 65° F., it increased in weight to 1 lb. $4\frac{1}{4}$ ozs., while the water was reduced to $1\frac{1}{16}$ pint. The water was a dirty brandy-colored liquid; and the turnips were still but little swelled and very tough. 3 quarts of fresh cold water (with one pint of hot subsequently added) were poured upon them; and the boiling kept up for $3\frac{1}{2}$ hours. The turnips, when drained, weighed $1\frac{1}{16}$ lb., and were tough,

fibrous, and incapable of being mashed into a soft mass. They retained little of the flavor and smell of fresh turnips. The water left from cooking measured 1¾ pints. It was a brandy-colored fluid, and had the taste of turnips.

Neither experiment yielded an article fit for food. The Board, therefore, unhesitatingly condemn the specimens experimented on, as *worthless*, in an alimentary point of view, *for the navy*.

JULIENNE.

Experiment 13. A tablet of 5 rations, 4 inches square by one-half thick, and weighing 4$\frac{1}{16}$ ozs., formed the subject of this experiment. It was in the usual excellent state of preservation, and was apparently made up almost entirely of carrots and cabbage, having a musty odor, and a mawkish and mucilaginous taste. Separated, and immersed half an hour in 3 pints of water at 90° F., it increased in weight to 22 ozs., was somewhat swelled, and had a strong sweet taste like that of carrots. The water of immersion measured, after draining, 2 pints, was high colored, and possessed a very sweet, rather disagreeable, taste. The carrots, though more crisp than when first immersed, were still tough and hard. Boiled in 7 pints of water, (including that of immersion,) with 4 pints subsequently added, it required 3¾ hours to complete the cooking. At its termination, the vegetables were rather soft, far from palatable, and still not sufficiently cooked. Their weight was now 1 lb. 9 ozs., and their appearance much like that of the respective fresh plants. The soup measured 1¼ pints, was of a deep straw color, and possessed the flavor of carrots. Whilst being in a measure palatable, it was decidedly *meager*, and seemed to be little more than a decoction of the predominant vegetable.

Experiment 14. A tablet of Julienne of 10 portions, 4 inches broad, 8 long and one-half thick, dry and in good condition, was next examined. Like the former, it appeared constituted of carrots and cabbage, and weighed 9½ ozs. It had a pale yellow and green color, a mucilaginous, sweetish taste, and a peculiar unpleasant odor. Separated, and immersed for 35 minutes in water at 65° F., it yielded, after draining, a dirty looking liquid, of a sickening taste, measuring 2 pints. The vegetables were very tough, and gave a

weight of 2 lbs. 9½ ozs. Rejecting the water of immersion, the Julienne was next put into 12 pints of cold water, to which 6 pints of hot water were added during the process of cooking; and the boiling was maintained for 4 hours over a brisk fire. The product was a very thin pottage, of a pale straw color, and a repulsive odor. The vegetables were weighed, and found to have augmented their weight to $3\frac{7}{16}$ lbs. The soup measured 4 pints.

In both trials, notwithstanding an enormous expenditure of fuel, water, and time, the vegetables were not sufficiently cooked to be pleasant to the palate, or wholesome for the stomach; thus affording another instance of the great difficulty generally experienced throughout our experiments, in boiling the *compressed* alimentary substances of Masson enough to fit them for table use. The Board was so unfavorably impressed with the result of both experiments that they did not think it worth while to try the effect of a more protracted ebullition.

SUCCORY—WILD ENDIVE—CHICORÉE.

Experiment 15. A single tablet weighing 4½ ozs. net, and found to be in good condition, formed the subject of this experiment. It had a herbaceous smell, a pale yellowish color, with green intermixed, and a taste, at first mucilaginous, but followed by bitterness on long chewing. The tablet, well separated, and immersed in 5 pints of water at 98°, became in half an hour much enlarged in bulk, had acquired a disagreeable taste and sickening smell, and imparted to the water a bitter quality, along with the color of pale brandy. It weighed $1\frac{9}{16}$ lb. The water of immersion, after the plant was withdrawn, measured 3½ pints. The succory was now put into a vessel containing 3 quarts of cold water, and placed on the fire to boil. Before the 3½ hours consumed in this process were out, it became necessary to add 12 pints of hot water; yet of all this only 3 pints were left at its termination. The plant was then well drained, and found to weigh $2\frac{7}{16}$ lbs. It was hard, stringy, tough, tasteless, and unfit to be eaten.

The Board are unable to conceive of any uses to which so forbidding a substance as succory, when thus prepared, can be applied on board the vessels of our navy, and therefore condemn it as perfectly *worthless* in every point of view.

PARSLEY—PERSIL.

Experiment 16. The sample used for the experiment was in good condition, weighing 3¼ ozs. net. It measured 4 inches square, by one-half thick. The color of the tablet was a beautiful apple-green; it emitted a peculiar heavy smell, and possessed a disagreeable parsley-like taste. It appeared to be composed of the leaves and stems of the plant. Separated, and immersed for half an hour in 3 pints of water at 90° F., and then strained, it weighed 13¾ ozs , was acrid to the taste, and had almost the precise odor of the fresh vegetable. The water of immersion measured 2 pints. After 3½ hours boiling in 8 pints of water, (including that of immersion,) it was found to weigh, when drained, 13 ozs., and to be still most repugnant to the senses of taste and smell, besides not being nearly as much cooked as it should be. During the cooking, it was found necessary to increase the quantity of water by 7½ pints, to save the substance from being burnt up before its termination. The water, left after the cooking, amounted to 1 quart of a high-colored dirty liquid, offensive alike to the palate and to the nose. As for the parsley itself, it was hard and stringy, and had swollen very little for the large proportion of water expended in its preparation.

The Board cannot express too *unfavorable* an opinion of it.

STRING BEANS—HARICOTS VERTS.

Experiment 17. A tablet measuring 4 inches square by rather less than one-half thick, weighed only 2⅛ ozs. net. It was composed of beans easily separated from each other, of a dull dark green hue, faint odor, a not unpleasant taste, and in an excellent state of preservation. The tablet, separated, and immersed in 4 pints of water at 110° F. for half an hour, augmented its weight to 7¼ ozs., and had acquired the taste and smell of the fresh plant to a certain extent. The beans remained hard and tough. A dirty discolored fluid, having a raw mawkish taste, and measuring 3¼ pints, represented the water of immersion left after the drainage of the beans. The beans were now boiled for 2¼ hours in 7¼ pints of water, (including the water of immersion;) and, during the process, 1 quart of boiling water was added, with the following result: 12 ozs. was now the weight of the drained vegetable, which

had the appearance of fresh beans, but without much of their savor, and was manifestly not enough cooked. The water remaining after the completion of the process, measured 4 ozs., was nauseous to the palate, and was high colored and dirty.

Experiment 18. This tablet weighed $2\frac{6}{16}$ ozs., and was found perfectly dry and well preserved. The tablet, separated, was immersed ½ hour in 3 pints of water at 60° F., with the effect of increasing its weight to 6 ozs. The water of immersion showed, after draining, a measure of $2\frac{4}{16}$ pints. Boiled in one gallon of fresh water, (that of immersion having been thrown away,) with the subsequent addition of a gallon of hot, the beans were found, at the end of 2 hours, far from tender, and quite tasteless. Their weight was now $1\frac{2}{16}$ lbs. The water left from cooking measured 2½ pints.

The beans in both these experiments fell far below the standard of excellence claimed for them by M. Masson, and struck the Board as a *very inferior*, unmanageable article of food.

GREEN PEAS—PETITS POIS.

Experiment 19. 5 rations neatly put up in a small bottle well stoppered, and the cork covered with a thick layer of wax. The peas, thoroughly dry, were somewhat shriveled in appearance, of a pleasant smell, and of no very decided taste. Their weight was 5¼ ozs. net. This quantity, after immersion for half an hour in 3 pints of water at 100° F., weighed 11¾ ozs. The peas swelled to nearly their natural size; and, though still hard and wrinkled, they bore a strong resemblance, in sensible qualities, to the fresh vegetable. The water of immersion now measured 2¼ pints, and had a mawkish taste. The peas were next placed over the fire in 3 pints of water, (including that of immersion,) and the boiling commenced; but before its completion, 5 pints of hot water were added. After 2½ hours of brisk ebullition, the peas were found nearly done, and of a flavor which assimilated them closely to the fresh vegetable. Seasoned with salt and butter, they made a decidedly palatable dish. Their weight had increased to 14¼ ozs. The water left from cooking amounted to 1½ pints, was very high colored, and of a sweetish taste.

Experiment 20. A sample, taken from a bottle put up in the same mode, was ascertained to weigh 5¼ ozs. It differed, in no respect, from the former specimen. Immersed half an hour in 3 pints of water at 60° F., its weight increased to 7½ ozs.; and there remained of the water of immersion 2¼ pints. The peas were only slightly swollen. The water of immersion having been rejected, 3 quarts of cold fresh water were now poured upon them; and the vessel was set on the fire to boil. Before the process was finished, it became necessary to add one quart of boiling water. At the end of 2½ hours of active boiling, the peas were found to be tolerably soft, and to manifest a natural taste, color, and smell. Their weight was 1 lb. 1½ pints of water remained after the cooking was concluded.

The Board consider the peas, petits pois, to retain the physical properties of the fresh vegetable in a high degree, and (under circumstances where it is convenient to subject them to a 3 hours' hard boiling) as being an *excellent* substitute for the latter, when it is not to be had.

GANNAL'S DESICCATED VEGETABLES.

In the instructions laid down by Gannal, we have particular directions for preparing each of his vegetable aliments for the table. As the Board have complied strictly with them in cooking each article, it will not be incumbent on us here to enter into details. Suffice it to say that, for most substances, he directs an immersion in cold water, properly salted, for a period which is longer or shorter, according to the nature of the vegetable used, and afterwards a thorough cooking over a fire (at first moderate) for about 15 minutes. Preserved potato, tapioca Français, requires no immersion before cooking; cabbage, an immersion in tepid water for a couple of hours; and carrots and turnips an immersion for 6 or 8 hours.

The various vegetables put up by M. Gannal were presented to us in a good state of preservation. His finer articles are in glass; but the inferior kinds are, as he states, stowed in wooden boxes lined with zinc. Part of those we examined were in bottles carefully corked, and covered with

thick foil; and the remainder in stout unglazed paper. In neither case did the moisture of the air appear to have affected the vegetables; none of which had been compressed.

POTATO—TAPIOCA FRANÇAIS.

Experiment 21. This substance was in glass. It consisted of small, light, worm-shaped particles, having a farinaceous, not unpleasant, taste, and a pale straw color. Very few black specks were interspersed through the mass, which was in an excellent state of preservation, being perfectly dry, and entirely free from mustiness of smell. The same sample was used in all our trials. 2 ozs. were cooked for 10 minutes near a hot fire in 10 ozs. of boiling water, with a view to prepare the soup so much lauded by Gannal; but, instead of it, we obtained a species of mush, resembling mashed turnips, with a faint potato-like odor, and which made a very palatable dish when seasoned with butter and salt.

Experiment 22 was undertaken in order to prepare the substitute for mashed potatoes spoken of by Gannal. Two ozs. of the potato were cooked in 5 ozs. of boiling water for 10 minutes; and, when removed from the fire, we found it much charred, adherent to the sides of the vessel, but exhaling the odor, and having the taste of baked potatoes. In both these trials the quantity of water used (which was that directed by M. Gannal) was much too small to accomplish the object in view; and, therefore, our results do not correspond with those promised by the manufacturer. The product, in both, was easily reduced, by pressure with a spoon, to the consistency of mashed potatoes.

Experiment 23. The same quantity of the potato was next treated in the same way, with four times the proportion of boiling water, and yielded a mass more discolored than common mashed potatoes, but of about the same consistency, and of rather a raw taste. The granules were easily mashed. On the whole, this preparation was less palatable than the two former, where Gannal's directions as to quantities of the potato and water were observed.

Experiment 24. (For Soup.) In order to give this substance a fairer trial than it appeared to have had in the trials where it became charred, the proportions were varied. ½ of a pint of the potato, weighing 2 ozs., was boiled for 30

minutes in 5 pints of water, which stood at 212° F., at the commencement of the process. The result was a thin meagre pottage, in which the still uncooked potato grains sank in a layer to the bottom of the vessel. The soup, so called, measured 2⅔ pints. The Board did not deem it either a grateful, or a wholesome dish.

Experiment 25. (For Porridge.) We boiled 3½ ozs. in 3 pints of water for twenty minutes; at the end of which time the vessel containing it was removed from the fire.—An excellent porridge measuring 1⅞ pints was the result.

These experiments were performed with the greatest care; and, although some of them did not result as well as could have been desired, enough was learned to give the Board *a high opinion* of the substance as a dietetic article. Of itself, a very neat and clean preparation, evidently made from the best selected roots, and possessing in its cooked state a flavor nearly approaching the fresh vegetable, its bulk is the only objection to its general use on board vessels of War. For the sick, however, it could be used with advantage as an aliment.

In reference to its merits, when compared with the corresponding articles prepared by Edwards and Masson, the Board are clearly convinced of its *great superiority* to both, and especially to that of Edwards.

CABBAGE—CHOUX.

Experiment 26. This was done up in white paper in the form of a thin brick, and gave a net weight of 1 lb. 9¼ ozs. The stems and leaves of the plant were in a perfectly distinct state, and could by picking be readily separated from each other. It was very dry. The preparation had a feeble taste and smell of cabbage, was on the whole rather a dirty looking article, and resembled very much the dried leaves of tobacco in general appearance. Separated and immersed for two hours in 15 pints of fresh water at 98° F., it gave a weight of 5 lbs. 14 ozs.; and emitted a most offensive odor. The water of immersion, left after the draining of the cabbage, measured 10½ pints. The cabbage was now put to boil in 9 quarts of cold water (throwing away that of immersion,) and to this was afterwards added ½ gallon. For 4¼ hours a most active cooking was kept up over an intensely

hot fire. Deeming it useless to persist longer, the cabbage was then taken from the fire and drained. Its weight had increased to 9 lbs. The water left after cooking measured 7½ pints. The cabbage appeared to be sufficiently boiled, but it was tasteless and totally unfit to be eaten.

The Board condemned it as a *worthless* article.

CARROTS—CAROTTES.

Experiment 27. These were in glass, were free from moisture and were otherwise apparently in the best condition. The mode of putting them up was perfectly unexceptionable, being contained in a bottle well corked, and covered with foil. They were in separate long slices, and had very much the color, taste, &c., of the recent plant. 1 pint weighing 4⅛ ozs., immersed for 12 hours in cold salted water sufficient to cover them, was found to have increased in weight to 1 lb. 2¼ ozs. The slices were considerably swelled, crisp and well flavored. The water left from immersion measured 1¼ pints, and had a sweetish taste. It was thrown away. Boiled for 2 hours in 6 pints of fresh water (at 65° F. when the cooking commenced) the carrots were then strained, and weighed 1 7/8 lbs. They were soft, well flavored, and, when seasoned with butter and salt, made a palatable dish.

The Board consider it an *excellent* preparation of its kind, but possibly too bulky for general use at sea. If such an aliment were required for the use of the sick, the Board would think this preparation well adapted to the purpose.

TURNIPS—NAVETS.

Experiment 28. These also were put up in bottles, and were in good condition. They were in separate, long slices, of a dull whitish color, and of the smell and taste of turnips. One pint of these slices, weighing 3 7/8 ozs., was steeped for 8 hours in a sufficient quantity of salted water to cover them. When taken out they were found swelled and crisp, with the natural flavor of turnips. Their weight was now 13⅛ ozs. The water of immersion was of the color of brandy, and of a sweetish taste: it measured 1¼ pints, and was thrown away. The turnips, well drained, were next boiled 1½ hours in 4 pints of fresh water (at 65° when the process began) until about one oz. only of a thick blackish sweet liquid was left.

After draining, the turnips weighed 1 $\frac{1}{16}$ lbs., and were still in distinct pieces. Generally the pieces were well softened, and easily mashed; but some remained tough and leathery. Their taste and smell were those of the boiled fresh vegetable.

The Board deem them a *pretty fair* article. But the turnip is at best a watery and sparingly nutritious vegetable, of little value as food for man.

JULIENNE—(FOR MAKING SOUP.)

Experiment. 29. This was in a bottle, and was composed of 10 different kinds of vegetables, arranged in layers, and all in a perfectly dry state. The weight of the contents was 1 lb. 2¼ ozs. The whole boiled for 3 hours in 21 quarts of water at first cold, gave a soup of a very good flavor, and requiring but the addition of some simple condiment to render it delicious.

The Board consider it a *very fine* preparation of its class.

SUCCORY—WILD ENDIVE—CHICOREE.

Experiment 30. This was put up in the same way; and its condition as to dryness was equally good. It was composed of what appeared to be the leaves and smaller stems of the plant in a state of minute division. The odor was mawkish, and the taste slightly mucilaginous. The net weight amounted to 2 $\frac{5}{16}$ ozs. This quantity was immersed in 6 pints of salted water at 65° F., and found after draining to have undergone but little change, except in weight, which now amounted to 15 ozs. The water of immersion was high colored, and had fallen to 5½ pints. The succory was then boiled for 1¾ hours in the water of immersion. It was found at the end of the process altogether too hard to be eaten, very unsavory as a dish, and, indeed, to have little more flavor than the most common weed. The water in which it was cooked, exhibited a very dirty and disgusting appearance, and possessed the same disagreeable taste as the plant.

The Board condemned the succory as a *worthless* article.

PARSLEY—PERSIL.

Experiment 31. The specimen, submitted to the Board, was in a loose and open paper, but in a perfectly dry condi-

tion. It was composed of the parsley plant tied up into little bundles; the whole of which were gently pressed together into the brick form. When chewed, the substance had a parsley like taste, and the smell of well dried hay. 1 pint of it, weighing 1 oz., was boiled for 2¾ hours, in 4 pints of salted water (at 65° F. when the process began) to which was added, meanwhile, 1 quart of boiling water; and the substance was then deemed sufficiently tested. When strained, it weighed 4¼ ozs., and was far from being sufficiently softened or cooked throughout. It had a deep grass-green color, a most disgusting taste, and almost as unpleasant an odor. No water was left from the cooking.

The Board infer from this trial that it is a *worthless* article for Naval purposes.

SORREL—OSEILLE.

Experiment 32. This article was put up in thick white paper, in the form of a brick, with leaves of paper between the layers. It was thoroughly dry, of a dark-green hue, and had no particular odor or taste. One pint of the plant, weighing $1\frac{5}{16}$ ozs., was put into 4 pints of water at 65° F., and boiled two hours; when it was strained, and found to weigh 7¼ ozs. It was perfectly cooked, and had rather an acid taste. The water, left after the draining was finished, amounted to 1 pint, and was of a deep brandy-color, with the taste and smell of the cooked plant.

The Board consider this specimen of the sorrel a *tolerably good* article of itself, but do not know of any circumstances under which it should be preferred at sea to articles of quite as easy access now in general use.

CAULIFLOWER—CHOU FLEUR.

Experiment 33. The cauliflower was contained in glass, and appeared to be in perfectly good order. It had the heavy, disagreeable smell, and the taste of common garden cabbage. One pint, weighing 3 ozs., was boiled for 1 hour and 10 minutes, in 4 pints of properly salted water, cold when the vegetable was put into it. This cooked it thoroughly. When allowed to drain it weighed $15\frac{7}{16}$ ozs. The water left from cooking measured 1½ pints, was of rather a high color, and had the flavor of cabbage.

The Board consider it an *excellent* article *per se*, but that its bulkiness and expensive *parvum in multo* form would operate against its general use at sea, except for the sick, and would limit its use for the crew to long voyages, as a preventive of disease.

BUNCH BEANS.

HARICOTS VERTS FLAGEOLETS.

Experiment 34. These were put up in a bottle, and appeared to be in the best possible condition. The individual beans were but little shrunken, were of a dull yellowish color, without odor, and possessed the taste of the fresh bean in a faint degree. Their weight was $12\frac{7}{16}$ ozs. Boiled for two hours in 8 pints of salted water, (at 65° F., when the process commenced,) and over a moderately hot fire, this quantity of beans had increased to $1\frac{3}{16}$ lbs. The beans had now regained the delicate hue and taste of the fresh vegetable, and were perfectly soft and mealy. In size and general appearance, they quite rivalled it. The water remaining from cooking amounted to 3 pints.

The Board were *very favorably* impressed with the qualities of this vegetable when boiled, and look upon it as a *valuable* dietetic article *for the Hospital Department* of ships of war.

MUSHROOMS—CHAMPIGNONS.

Experiment 35. These also were put up in glass. Their odor and taste were those of the natural plant, and their state of preservation good. They weighed $2\frac{1}{16}$ ozs. Immersed for 10 minutes in 3 pints of boiling water, they became swollen, and increased in weight to $13\frac{9}{16}$ ozs. The water had been reduced to $2\frac{1}{2}$ pints, and became imbued with the odor of mushrooms. After draining, the mushrooms were cooked in 3 ozs. of olive oil, examined repeatedly, and, after a long cooking, were still tough and crude. At the end of two hours they became charred, and were *not fit* to be used for food. The directions of Gannal for preparing them were followed as nearly as possible; but they were very inexplicit.

The Board could form no opinion in the case, (there being no other bottle with which to repeat the experiment,) except from the appearance of the vegetable before the ex-

periment was entered upon; and this recalled the fresh plant to a very fair extent.

BRUSSELS CABBAGE—CHOU DE BRUXELLES.

Experiment 36. In glass, and quite dry. This specimen was composed of very small heads of cabbage, having a delicate green hue, and rather a mawkish taste and smell. Their weight was 1⅛ ozs. This quantity was boiled for 1 hour and 20 minutes in salted water; and, when removed from the fire, the heads were found quite done. Their taste was sweetish; but both this and the odor had a dash of the common cabbage. Drained and weighed, they came up to 5⅛ ozs. The water, remaining from the cooking, amounted to ¾ pint. The heads were scarcely increased by the cooking. Properly dressed, and seasoned with butter and salt, or a little vinegar, they formed a *highly palatable* dish.

The Board are ignorant of any other use to apply them to in the navy than as *dainties* for officer's messes.

SPINAGE—EPINARDS.

Experiment 37. In glass, and in good condition. It is composed of minute, leaf-like portions, which have a pale green color and sickening taste, and an odor somewhat like that of fresh spinage. The weight of the contents of the bottle was 3½ ozs. This, having been steeped for two hours in 8 pints of cold water, and then drained, had increased in weight to 1 lb. 4½ ozs., was of a beautiful grass-green, but retained the obnoxious taste and smell. The water of immersion presented much the same properties; it measured 6½ pints. In this water the plant was boiled for two hours, and found to be perfectly well cooked. It weighed, when drained, 1 lb., and had improved in neither taste nor smell; but, on the contrary, was, if possible, more disagreeable than before. The water left from the cooking measured 3 pints, was of a dirty greenish color, and had a mawkish flavor.

The Board rejects this spinage as *utterly worthless.*

ONIONS—OGNONS.

Experiment 38. These were in small pieces, and had been exposed to the air in loose paper. Nevertheless, they

were quite free from moisture. Their taste, smell, and general appearance were those of the fresh plant. 1 oz. was boiled in half a pint of salted water, (at 65° F., when the cooking commenced,) and, after the addition of 1 pint of boiling water, was considered cooked, in about 1½ hours. The vegetables now possessed the sensible qualities of the onion in a high degree. Their weight, when drained, was 4 oz. The water left from the boiling measured ¼ pint.

Those fond of this bulb, pronounced this specimen of it *delicious.*

BEETS—BETTERAVES.

Experiment 39. These were composed of transverse, well dried, hard slices, with the color and taste of the fresh beet. They had been exposed to the air in loose paper, without injury. 1 oz. of them was steeped, for 12 hours, in equal parts of cold vinegar and water, just sufficient to cover them. When drained, they weighed 3¼ ozs., and were quite tender. Their flavor and appearance were excellent.

Experiment 40. 1 oz. from the same sample was put into 1 quart of fresh cold water, and kept boiling for 1¾ hours. By this process, its weight increased to 5 ozs., and the vegetable became tender, and acquired the taste of cooked beets recently from the garden. The water left measured 2 ozs.

These beets are a *good* and *palatable* article, well adapted, in the opinion of the Board, for general use in the navy, whether as an *aliment*, or simply as a *pickle;* though, in this latter respect, they are not superior to that now used in the navy.

DE LIGNAC'S CONSERVE OF MILK.

The directions given to prepare this substance for use as an article of food, are very simple. One part of the conserve boiled for a moment with 5 times the quantity of water, forms a milky fluid, which is stated to be ready for the table, without the addition of sugar.

Three tin canisters of "Preserved Milk" were submitted to us for examination. Their weights were, respectively,

lb.	oz.	ds.	
1,	8,	10,	} gross; the average of which is 1 lb. 8 ozs., 13 dr. When
1,	8,	3,	
1,	9,	10,	

opened, the conserve appeared in the form of a semi-translucent, cream-colored paste, which emitted the smell of boiled milk, and had a very sweet taste. The paste was soft and homogeneous, and looked much like certain kinds of butter. Its sugar crackled between the teeth, and obviously entered liberally into the compound.

Experiment 41. 3 ozs. of the conserve, being treated with a proper quantity of water heated to 90° F., was brought to the boiling point as quickly as possible. Though the treatment conformed strictly to the directions of the inventor, the result was not satisfactory. The mixture presented the blue appearance of thin milk and water; it had some oily particles floating on the surface, and was, moreover, pervaded by a quantity of curdy lumps throughout.

Experiment 42. The same proportions were employed; but the water was 100° F. at first; and the paste was assisted in combining with the water by the pressure of the spoon. On boiling a few minutes, we obtained a richer looking preparation than the former; but there were still lumps of the curdy substance interspersed, though to a less degree than in the former trial.

Experiment 43. In this instance, with the same proportions, (3 ozs. to 15 ozs.,) care was taken to incorporate thoroughly the paste with water of a temperature of 100° before setting the mixture on the fire to boil. By this means there resulted a milky looking preparation, which was perfectly homogeneous in its composition, and displayed a large quantity of yellowish, oily particles on the top. Not the slightest trace of curd was now visible. The taste was very saccharine, and not a little like boiled cow's milk over-sweetened. After standing in a covered vessel for 20 hours, it was still sweet, with the odor of boiled milk; and there had risen to the surface a larger quantity of the butter-like matter.

In the absence of any certain knowledge as to the precise mode in which the "conserve" is prepared, and well ap-

prized of the great extent to which the adulteration of milk is carried in France, the Board refrain from doing more than detailing the trials they have made with it, and the changes it has appeared to them to undergo, *without venturing upon any recommendation* as to its employment in the navy, or elsewhere.

The following table presents a synoptical view of the preceding experiments, arranged in the order in which they have just been recorded:

TABLE.

No. of experiment.	Article experimented upon.	Weight before immersion, (Avoirdupois.) lbs.	oz.	drs.	Weight after immersion. lbs.	oz.	drs.	Quantity of water used for immersion. galls.	qts.	pts.	Temperature of the water used for immersion. Fahr't.	Duration of immersion. h.	m.	Quantity of water remaining after immersion. qts.	pts.	Weight gained by immersion. lbs	oz	dr.	Relative proportion of weight before & after immersion.	Quantity of water used in cooking. galls.	qts.	pts.	Quantity of water used in cooking, being part of that stated in preceding column. galls.	qts.	pts.	Duration of the process of cooking. h.	m.	Weight of the substance after cooking. lbs.	oz.	dr.	Relative proportion of weight before immersion & after cooking.
	Edwards'																														
1	Patent preserved potato.	.	12	.	.	.	.	.	.	.	..	.	.	.	.	.	.	.	..	.	boil'g 1	.	.	.	.	.	15	.	.	.	..
2	"	.	12	.	.	.	.	.	.	.	..	.	.	.	.	.	.	.	..	.	boil'g 1	.	.	.	.	.	15	.	.	.	..
3	"	1	.	.	.	.	.	.	.	.	..	.	.	.	.	.	.	.	..	.	.	boil'g 3	.	.	.	.	15	.	.	.	..
4	"	1	.	.	.	.	.	.	.	.	..	.	.	.	.	.	.	.	..	.	.	boil'g 3	.	.	.	.	15	.	.	.	..
	Masson's																														
5	Potato - - - - -	.	2	.	.	3	6	.	.	1	110	1	.	.	$1\frac{3}{6}$	.	1	6	1.69	.	.	1	.	.	.	1	5	.	3	.	1.50
6	"	.	2	.	.	3	5	.	.	1	65	2	15	.	$1\frac{4}{6}$	.	1	5	1.66	.	.	2	.	.	.	1	.	.	7	.	3.50
7	Cabbage - - - -	.	4	5	1	5	.	.	2	.	90	.	30	1	1	1	.	11	4.87	1	1	1	.	2	.	3	30	1	13	8	6.84
8	"	.	7	6	2	5	.	.	5	.	90	.	30	3	.	1	13	10	5.00	2	2	.	1	.	.	3	30	3	1	12	6.75
9	Carrots - - - -	.	4	13	1	.	.	.	1	1	110	.	30	1	$1\frac{3}{6}$	.	11	3	3.32	*	2	1	*	.	1	.	2	45	1	9	4	5.25
10	"	.	4	10	.	13	8	.	1	.	78	.	30	.	$1\frac{1}{2}$	.	8	14	2.92	.	3	1		.	1	1	2	45	1	11	8	5.95
11	Turnip - - - - -	.	5	1	1	9	.	.	1	1	110	.	30	.	$1\frac{1}{2}$	1	3	15	4.94	2	3	.	2	.	.	3	15	1	11	12	5.48
12	"	.	4	13	1	4	4	.	1	1	65	.	30	.	$1\frac{4}{6}$	.	15	7	4.21	.	3	1	.	.	1	3	30	1	11	.	5.61
13	Julienne - - - -	.	9	8	2	9	8	.	3	.	65	.	38	1	.	2	.	.	4.37	2	1	.	.	3	.	4	.	3	3	.	5.37
14	"	.	4	14	1	6	.	.	1	1	90	.	30	1	.	1	1	2	4.82	*1	1	1	.	2	.	3	15	1	9	.	5.13
15	Succory - - - -	.	4	8	1	9	.	.	2	1	98	.	30	1	$1\frac{1}{2}$	1	4	8	5.56	2	1	.	1	2	.	3	30	2	7	.	8.67
16	Parsley - - - - -	.	3	4	.	13	12	.	1	1	90	.	30	1	.	.	10	8	4.23	1 *	3	$1\frac{1}{2}$ *	.	3	$1\frac{1}{2}$	3	30	.	13	.	4.00
17	String Beans - - -	.	2	2	.	7	4	.	2	.	110	.	30	1	$1\frac{1}{4}$	.	5	2	3.41	1	.	$1\frac{1}{4}$	.	1	.	2	15	.	12	.	5.65
18	"	.	2	6	.	6	.	.	1	1	60	.	30	1	$1\frac{4}{6}$	.	3	10	2.53	2	.	.	1	.	.	2	.	1	2	.	7.58
19	Green Peas - - -	.	5	4	.	11	12	.	1	1	100	.	30	1	$\frac{1}{4}$	.	6	8	2.24	*1	.		.	2	1	2	30	1	14	4	5.76
20	"	.	5	4	.	7	8	.	1	1	60	.	30	1	$1\frac{4}{6}$	.	2	4	1.43	.	3	.	.	.	.	2	30	1	.	.	3.05
	Gannal's																														
21	Preserved Potato - -	.	2	.	.	.	.	.	.	$1\frac{0}{6}$	212	.	.	.	.	.	.	.	..	.	.	$\dagger 1\frac{0}{6}$	.	.	.	.	10	.	11	8	5.75
22	"	.	2	.	.	.	.	.	.	$1\frac{5}{6}$	212	.	.	.	.	.	.	.	..	.	.	$\dagger 1\frac{5}{6}$	.	.	.	.	10	.	2	10	1.31
23	"	.	2	.	.	.	.	.	.	$1\frac{4}{6}$	212	.	.	.	.	.	.	.	..	.	.	$\dagger 1\frac{4}{6}$	.	.	.	.	10	.	.	.	..

TABLE.—Continued.

No. of experiment.	Article experimented upon.	Weight before immersion, (Avoirdupois.) lbs.	oz.	drs.	Weight after immersion. lbs.	oz.	drs.	Quantity of water used for immersion. galls.	qts.	pts.	Temperature of the water used for immersion. Fahr't.	Duration of immersion. h.	m.	Quantity of water remaining after immersion. qts.	pts.	Weight gained by immersion. lbs	oz	dr.	Relative proportion of weight before & after immersion.	Quantity of water used in cooking. galls.	qts.	pts.	Quantity of water used in cooking, being part of that stated in preceding column. galls.	qts.	pts.	Duration of the process of cooking. h.	m.	Weight of the substance after cooking. lbs.	oz.	dr.	Relative proportion of weight before immersion & after cooking.
	Gannal's																														
24	Preserved potato -	measuring of a pint.	2	and ⅓	.	.	.	.	2	1	212	.	.	.	.	.	.	.	..	†	2	1	.	.	.	.	30	measuring 2 ½ pts.			7.00
25	"	.	3	8	.	.	.	.	1	1	212	.	.	.	.	.	.	.	..	†	1	1	.	.	.	.	20	measuring $1\frac{1}{16}$ pt.			..
26	Cabbage - - - -	1	9	4	5	14	.	.	7	1	98	2	.	5	½	4	4	12	3.72	2	3	.	.	2	.	4	15	8	14	.	5.62
27	Carrots - - - -	.	4	13	1	2	4	sufficient to cover them salted.			65	8	.	.	1¼	.	9	11	3.79	.	3	.	.	.	.	1	30	1	1	.	3.53
28	Turnips - - - -	.	3	7	.	13	2	sufficient to cover them salted.			65	8	.	.	1¼	.	9	11	3.82	.	2	.	.	.	.	1	30	1	1	.	4.95
29	Julienne - - - -	1	2	4	.	.	.	.	.	.	..	.	.	.	.	.	.	.	..	5	1	.	.	.	.	3	.	.	.	.	..
30	Succory - - - -	.	2	5	.	15	.	.	salt'd 3	.	65	2	.	2	1¼	.	12	11	6.49	.	†	$1\frac{5}{16}$	.	.	.	1	45	1	.	12	7.24
31	Parsley - - - -	.	1	.	.	.	.	.	salt'd 2	.	65	.	.	.	.	.	.	.	..	.	*3	.	.	1	.	2	45	.	4	4	4.25
32	Sorrel - - - -	.	1	5	.	.	.	.	salt'd 2	.	65	.	.	.	.	.	.	.	..	.	†2	.	.	.	.	2	.	.	7	4	5.52
33	Cauliflower - - -	.	3	.	.	.	.	.	salt'd 2	.	65	.	.	.	.	.	.	.	..	.	†2	.	.	.	.	1	10	.	15	7	5.15
34	Bunch Beans - - -	.	12	7	.	.	.	.	salt'd 4	.	65	.	.	.	.	.	.	.	..	†1	.	.	.	.	.	2	.	1	13	.	2.33
35	Mushrooms - - -	.	2	14	.	13	9	.	1 salted	1	212	.	10	1	⅓	.	10	11	4.72	olive oil		3 oz.	.	.	.	2	.	.	.	.	..
36	Brussels Cabbage -	.	1	2	.	.	.	.	1	½	65	.	.	.	.	.	.	.	..	.	†1	½	.	.	.	1	20	.	5	13	5.17
37	Spinage - - - -	.	3	8	1	4	8	1	.	.	65	2	.	3	½	1	1	.	5.86	.	3 being the water of immersion.	½	.	.	.	2	.	1	3	.	5.43
38	Onion - - - -	.	1	.	.	.	.	.	.	salt'd ½	65	.	.	.	.	.	.	.	..	.	.	*1½	.	.	1	1	35	.	4	.	4.00
39	Beets - - - -	.	1	.	.	3	4	vinegar & water		each $\frac{4}{16}$	60	12	.	.	vr. w. ⅓	.	2	4	3.25	no cooking required.			.	.	.	.	.	of pickled beets.	3	4	
0	"	.	1	.	.	.	.	.	1	.	65	.	.	.	.	.	.	.	..	.	1	.	.	.	.	1	45	.	4	12	..
	De Lignac's																														
41	Conserve of Milk -	.	3	.	.	.	.	.	.	$\frac{5}{16}$	90	.	.	.	.	.	.	.	..	.	†	$\frac{5}{16}$	.	.	.	.	5	.	.	.	..
42	"	.	3	.	.	.	.	.	.	$\frac{5}{16}$	100	.	.	.	.	.	.	.	..	.		$\frac{5}{16}$	.	.	.	.	5	.	.	.	..
43	"	.	3	.	.	.	.	.	.	$\frac{5}{16}$	110	.	.	.	.	.	.	.	..	.		$\frac{5}{16}$	.	.	.	.	5	.	.	.	..

* Including that of immersion.

† Water of immersion.

After we had terminated the examinations and experiments, which we have just recorded, on the various alimentary substances, submitted to us, at the commencement, by the Chief of the Bureau of Provisions and Clothing, he laid before us, for examination,

A tin canister of Edwards' "Patent Preserved Potato,"

A bottle of the "Preserved Potato" of Messrs. Lewis, of Boston, and

A tin canister of De Lignac's Preserved Milk, (conserve de lait.)

These we examined, and submitted to experiments similar to those fully detailed, with the previous articles. The substances like the former, were carefully put up, and in good preservation.

The canister of Edwards' potato contained about a pint. The granules were like those in the large cases, except that they were much clearer, lighter colored, and freer from dark specks, and from unpleasant smell and taste.

Treated like the former specimens, they had a crude and foreign taste, and were pronounced, by all who tried them, to be "*bad.*"

Lewis' preserved potato was in the form of irregular granules, of a dull yellowish color, with few dark specks, and otherwise clear, as if it had been carefully prepared. It was perfectly dry, and had a natural taste and odor.

Submitted to trials like those made with Edwards' potato, it gave a result of which we thought favorably, and which wanted, we may suppose, but the hand of the culinary *artiste* to render it an *excellent* dish of mashed potato.

The preserved milk of De Lignac, which resembled, in every respect, the specimens before submitted to us, gave, on a repetition of the experiments, a repetition of results like those already recorded; forming, when merely boiled for a few moments, agreeably to the direction of the manufacturer, with five times its amount of water, a sweet, thin, milky fluid, filled with curdy masses, but, when carefully combined with the hot water by persevering malaxation with a spoon before boiling, constituting a homogeneous fluid, free from curds, and consequently richer than the former, and not distinguishable in taste, smell, and appearance, from sweetened boiled milk, and, in either case, presenting, on cooling, a

superficial layer of yellow, fatty, or buttery globules. The only additional observation, which we made on this "conserve," was the exposure of part of it to the open air for a fortnight, at the end of which time, it had undergone no sensible change; nor did it give, when treated with boiling water, any impaired result.

With a result thus favorable, so far as the sensible qualities, and the keeping properties, of De Lignac's "conserve de lait" are concerned, *we cannot*, nevertheless, *depart from the reserve, before maintained, in regard to it, by recommending*, for either general or partial use in the navy, an alimentary substance, of the mode of preparing which we have no certain knowledge, which is readily susceptible of sophistication, and of the genuineness of which we have no satisfactory assurance.*

Having now concluded our experiments on the various alimentary substances submitted to us, we will present, in one view, the opinions at which we arrived in regard to them.

Edwards' potato—"inferior."
Masson's potatoes—"disagreeable."
Do. cabbage—"very palatable."
Do. carrots—"excellent."
Do. turnips—"worthless for the navy."
Do. julienne—"meager."
Do. succory—"worthless."
Do. parsley—"worthless."
Do. string beans—"inferior."
Do. green peas—"excellent."
Gannal's potato—"excellent."
Do. cabbage—"worthless."
Do. carrots—"excellent."
Do. turnips—"pretty fair."
Do. julienne—"very fine."
Do. succory—"worthless."
Do. parsley—"worthless."
Do. sorrel—"tolerably good."
Do. cauliflower—"excellent."

* It is proper to remark here that the "conserve de lait," submitted to us, was received by the Chief of the Bureau of Provisions and Clothing, from M. De Lignac himself, who was represented to him as highly respectable, and who has a contract for supplying the French and English navies.

Gannal's bunch beans (flageolets)—" excellent."
Do. mushrooms—" not good."
Do. Brussels sprouts—" delicious dainties."
Do. spinage—" worthless."
Do. onions—" delicious to onion eaters."
Do. beets—" good as an aliment or pickle."
De Lignac's " Preserved Milk"—" not recommended."
Lewis' potato—" good."

It will thus be seen that the only articles that, in our hands, proved themselves to be good, were the cabbage, carrots, and green peas of Masson; the potato, carrots, turnips, julienne, sorrel, cauliflower, bunch beans (flageolets,) Brussels sprouts, onions, and beets of Gannal; and the potato of Lewis.

But the good quality of an aliment, that is, its property of being, when cooked, an agreeable and digestible article of food, though obviously its highest recommendation, is one only of a number of items in the question of its adaptability to the navy, either as an addition to the ration, as a substitute for some part of it, or as an article of hospital stores, and diet for the sick. Its nutritive properties, its keeping properties, its volume, the amount of time, water, and fuel required for cooking it, and, perhaps also, its cost, enter essentially into this important question.

The determination of the relative nutritive powers of the various alimentary substances has long occupied the attention of the chemist and the physiologist. Although their researches have not led to absolutely uniform results; yet the proportion of solid matter, which each article contains, has been determined with considerable accuracy; and there is a general agreement of opinion as to the positive and relative amount of nutrient matter contained in the principal articles of food.

Scales of nutritive equivalents have accordingly been made out, and will serve as a guide, in conjunction with our knowledge of the sensible qualities of an aliment, in estimating its value as an article of food; ever bearing in mind, however, the fact, established by a host of experiments, that variety of food is indispensable to animal subsistence; that an article of food, believed to possess little nutritive power, may, in combination with others, prove highly nutritive; that an animal, fed on any one, even of the proteinaceous, and

highly nitrogenized aliments exclusively, will die of starvation; and that a multiplicity and mixture of articles of food are necessary to maintain, not bodily vigor only, but animal life.

The estimate of the nutritive value of an aliment is, in the absence of results derived from practical tests, usually based on the assumption that, in a mixed diet, which contains all the principles necessary for the nutrition and growth of the animal body, there is a relation between the proportion of nitrogen contained in food, and its nutritive quality. Though this assumption is apparently opposed by the fact that some highly nitrogenized substances, considered singly, are believed to be little nutritive, yet it is generally adopted by physiologists as affording the safest foundation at present known, on which to estimate the value of an aliment as an article of food.

We will, therefore, agreeably to the standard usually appealed to, and in the absence of more certain knowledge to guide us in the appreciation of an article of food, exhibit the results of organic chemistry in its determination of the proportion of the solid matter, and also of the nitrogen, contained in some of the most important of the alimentary substances, followed by a scale of the nutritive equivalents which chemists have deduced therefrom.

The quantity of solid matter, and of nitrogen, contained in 100 parts of the following substances, is thus set down by chemists, whose results do not, however, always rigorously agree with each other.

Meat	(100 parts)	contains	26	of dry matter, and	3.91	of nitrogen.
Wheat	"	"	90	"	2.07	do.
Bean	"	"	85.13	"	3.66	do.
Pea	"	"	84.97	"	3.57	do.
Rice	"	"	95.00	"	1.32	do.
Potato	"	"	24.10	"	0.37	do.
Cabbage	"	"	7.70	"	0.28	do.
Turnip	"	"	7.50	"	0.17	do.

Agreeably to Boussingault's scale of nutritive equivalents,

100 parts of wheat flour are equal to
107 " " wheat,
56 " " beans,

810 parts of cabbage, or 83 parts of dried cabbage,
177 " " rice,
138 " " Indian corn,
67 " " peas,
613 " " potatoes, or 126 parts of dried potatoes,
757 " " carrots, " 95 " " carrots,
1335 " " turnips.

It thus appears that the turnip has little alimentary value; that ten lbs. and a half of fresh potatoes, or rather more than two pounds of the *dried*, are equal, in nutritive power, to one pound of meat; that *dried* cabbage and carrot have a higher proportional nutritive value than wheat flour; and that even the fresh leguminous seeds, (as peas and beans,) are much more nutritious than the cereal grains.

In view, then, of the importance of a varied diet for the preservation of health and strength, and, in particular, for the prevention of the development of the multiform scrofulous diseases so incident to sailors; and in view, also, of the fact, fully established nearly a century ago, that the potato, in its *cooked* state, as well as in its raw, is a valuable anti-scorbutic, there is reason to believe that, to the three articles of vegetable diet, (flour, beans, and rice,) which constitute the only vegetable aliments that enter into the navy ration at sea, the potato, cabbage, and carrot, in the concentrated form in which they are now prepared and preserved, might be very advantageously added; not, however, for the purpose of increasing the amount of the ration, but to vary the diet, during long voyages, by alternating with the other vegetables.

In regard to the third consideration, the keeping properties of the vegetables that were submitted to us, it is sufficient for us to remark that they have been in the possession of the Chief of the Bureau of Provisions and Clothing for nearly a year, and that they are, with unimportant exceptions, in a state of perfect preservation.

Though we cannot speak from experience of the fact, we have no reason to believe that they would undergo greater changes, during a cruise in a hot and damp climate, than the biscuit, flour, beans, rice, corn-meal, coffee, &c., &c., that form the chief vegetable aliments of every long voyage.

The fourth consideration is the space they would occupy. This objection certainly cannot lie against Masson's com-

pressed vegetables, in the compact form of tablets wrapped in tin foil, in which they are put up. Nor, in our opinion, will it lie against the beautifully prepared vegetables of Gannal, when put up in boxes with metallic linings, as proposed by him, when designed for the crew; whilst, if preferred, the more bulky and costly form of enclosure in bottles may be reserved for the hospital department, and for officers' messes.

The fifth consideration, that we have mentioned, is the amount of fuel, water, and time required for cooking. A reference to our statement of the experiments will show that this was, in some cases, considerable; whilst, on the contrary, in the case of the potato, the cooking was an affair of but a few moments.

The last consideration, if it be a consideration, which we think belongs to the question of the use of these dried vegetables in the navy, regards their cost. To the degree, then, in which expense will influence the ration, it will operate against the introduction into it of any of these substances; for they cost more than its present vegetable constituents, as the following exhibit will show:

Flour costs 3 cents per pound, for the navy.
Rice do. 3¾ do. do.
Beans do. $1 70 per bushel, do.

The prices of the dried vegetables are set down as follows, viz:

Cost of vegetables prepared by Chollet & Co., according to Masson's process.

Cabbage,	per Killogramme,	4	francs.
Carrots,	do.	4	do.
Turnips,	do.	4	do.
Julienne,	do.	4	do.
Parsley,	do.	12	do.
Succory,	do.	9	do.
String Beans,	do.	12	do.
Green Peas,	do.	12	do.
Potato, (in slices)	do.	1.50	do.

Edwards' potato about 13¾ cents per pound.

Gannal's prices are not believed to vary essentially from Masson's. (See table, page 36.)

Lewis' potato will be furnished at 12½ cents per pound by the quantity.

A kilogramme is 2 lb. 3 ozs. 5 dr., avoirdupois.

A franc is 18¾ cents.

100 grammes, or 3 ozs. 8½ dr. of *dried* cabbage would be more than enough for a ration, and would cost about 7½ cents.

In estimating the cost of rationing the navy, however, we should not lose sight of the large amount of provisions annually spoiled in the public store houses, or condemned on ship board and thrown into the sea. If the dried vegetables, now under consideration, should prove to keep better than the vegetable constituents of the present ration, to the degree in which they will do so, will their relative excess of cost be reduced.

It remains for us, in concluding this report, merely to recapitulate the results from the specimens submitted, and which were received by the Chief of the Bureau in person from Chollet & Co., Gannal, and Edwards, respectively.

1st. We condemn Edwards' "Preserved Potato" as positively bad.

2d. Of Masson's vegetables, we found the cabbage, carrots and green peas, of good quality, and making after long cooking, excellent dishes. The cabbage and carrots were compressed, and covered with tin foil. Their compactness and good quality would, therefore, commend them for general use in the Navy. The peas were uncompressed; and though an excellent vegetable, they do not, we think, possess any very marked advantage, as a constituent of the ration, over the bean now in use, and so especially the favorite of sailors.

3d. Of Gannal's vegetables, the potato, carrots, turnips, julienne, sorrel, cauliflower, bunch beans, flageolets, Brussels sprouts, onions and beets answered the commendations of the manufacturer, and proved good in our hands. They were all beautifully put up, and made excellent dishes. Should they, however, be deemed too costly as parts of the established ration under ordinary circumstances; the potato, carrots and cauliflowers, at least, might very advantageously enter into the ration of the crew during long voyages, as preventives of disease; and especially would they, as also the haricots verts flageolets, form valuable additions to the usual hospital stores, and for officers' messes.

4th. Lewis' "Preserved Potato" we found good, though not so

beautiful a preparation as that of Gannal. It might, in conjunction with some of the former, be advantageously given to the crew in long voyages as a change of diet, so important to health, and as a valuable preventive of scurvy.

5th. De Lignac's "conserve de lait," we cannot venture to recommend, not knowing what it is.

6th. Lastly. We, therefore, respectfully recommend, with a view to test the applicability of any of these dried vegetables to the Navy, that a quantity, sufficient for trial, of the cabbages and carrots of Masson, of the cauliflowers and carrots of Gannal, and of the potato of Gannal and Lewis, be placed on board of two or three of our national ships, to be served out to the crew, once a week, during long voyages, either in place of rice and cheese, or in addition to the established ration; and also that, with a similar view, they, together with the haricots verts flageolets, be added to the usual Hospital Stores for invalids, during long voyages.

We have the honor to be, with great respect,

Your obedient servants,

B. WASHINGTON,
Surgeon U. S. Navy.

GEO. CLYMER,
Surgeon U. S. Navy.

J. BEAL,
Surgeon U. S. Navy.

Hon. Wm. A. Graham,
Secretary of the Navy.

U. S. Store Ship Relief, at Sea,
May 27th, 1852.

Sir:

In obedience to your order of May 3d, 1852, we have tested the qualities of "Edwards' preserved potato" during several weeks at our mess table, and have found them wholesome, palatable, and worthy of recommendation as a substitute for the common Irish potato at sea.

We are sir, very respectfully,
Your obedient servants,
GEO. M. RANSOM, Acting Master.
WM. H. WILCOX, Passed Midshipman.
JNO. E. HART, Passed Midshipman.

Lieut. Comd't H. K. Thatcher,
Comd'g U. S. Store Ship Relief.

U. S. Ship Relief, at Sea,
27th May, 1852.

Sir:

To the above, I beg leave to add that, after having thoroughly tested Edwards' patent preserved potato, I am satisfied that it is an *invaluable* article for long voyages, and I cannot too highly recommend it to the Bureau.

I am sir, with great respect,
Your obedient servant,
HENRY K. THATCHER,
Lieut. Comd'g.

Wm. Sinclair, Esq.,
Chief of Bureau of Provisions and Clothing,
Washington.